TWENTY-FIFTH YEAR

The Heating and Ventilating Magazine

A Monthly Journal of Engineering Progress

XXV. No. 9.
a year. 30 cents a copy.

SEPTEMBER, 1928

Heating & Ventilating Magazine Co.
386 Fourth Avenue, New York.

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323 VENT TRAP

THE "WEBSTER LINE"

IN the "Webster line" there is nothing *new* in the sense that it is untried; nothing *old* in the sense that it is obsolete. Every item is *proved* under actual service conditions—and the proof is always available. Reliability is in-built as a cumulative result of forty years of invention, progress and experience during which correct application and use have consistently been placed ahead of the mere sale of apparatus.

Bulletin describing any item of the "Webster Line" will be sent on request.

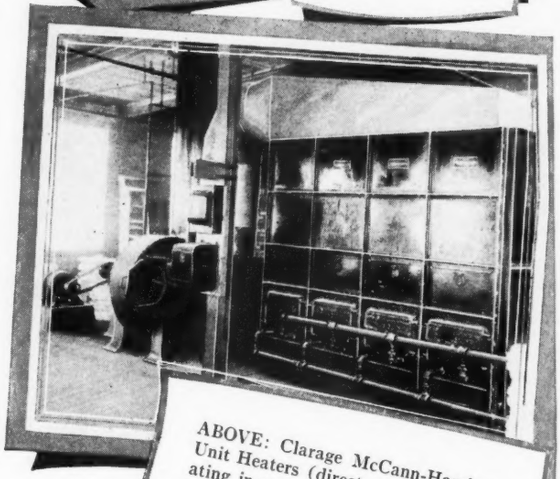
- since 1888

Webster
Systems
of Steam Heating

Warren Webster & Company, Camden, New Jersey
Pioneers of the Vacuum System of Steam Heating
52 U. S. Branch Offices
In Canada, Darling Bros., Ltd., Montreal

LEFT: Clarage Ceiling Type Unit Heaters installed in machine shop. Warm air distributed in all horizontal directions and deflected down (exclusive feature).

ABOVE: Clarage Floor Type Unit Heater installed in stereotype dept. of bread wrapper mill.



ABOVE: Clarage McCann-Harrison Unit Heaters (direct gas fired) operating in ceramic plant. On one large installation $50,000 saved in first cost.

Who knows most about Industrial *unit* Heating?

THERE is no longer any doubt about the important advantages of unit heating. It means lower operating costs, higher efficiencies, more rapid heating and greater flexibility — *if* you install the right equipment to meet your particular case.

But make no mistake about that *if*. It is the key to satisfactory results. Remember, requirements vary widely—you may be short on steam—Brown may have plenty—you may be cramped for space—Jones may have space to spare—you may be generating hot waste gases—Smith, perhaps, could best use oil.

This company is not forced to recommend one type of unit heating equipment as the answer to every requirement. Nor is such an attempt made. We build all accepted types of unit heaters—both ceiling and floor types that utilize steam or hot water—and direct oil or gas fired heaters which do not need any boiler equipment.

Thus Clarage engineers can give an unbiased recommendation, one based entirely upon the needs of the problem at hand. For this reason Clarage installations are satisfactory installations—results obtained—maximum economies effected. If you are interested, write for our literature; or give us definite information about your problem.

CLARAGE FAN COMPANY, Kalamazoo, Mich.

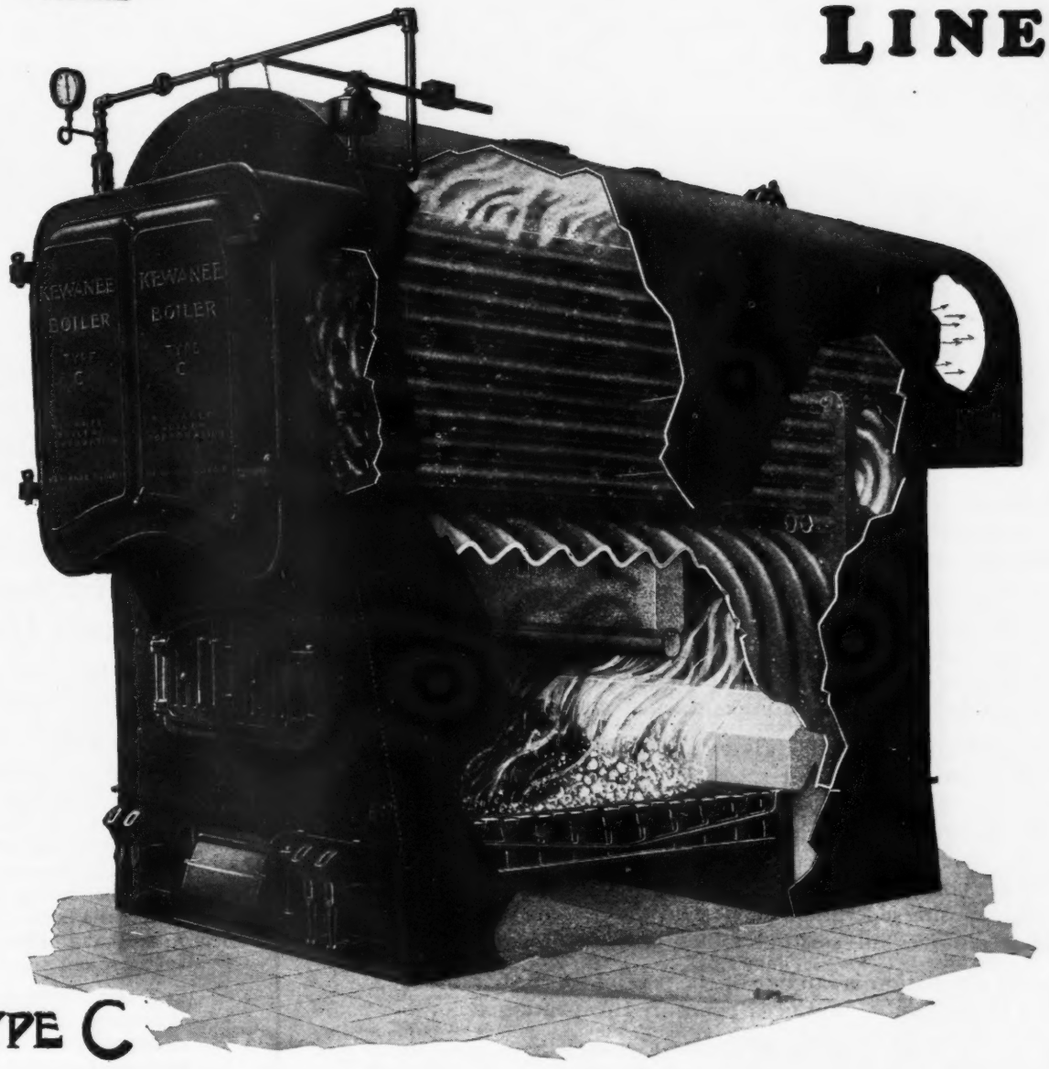
Sales Engineering Offices in Principal Cities

CLARAGE

UNIT HEATERS—*All Types*

UTILIZING STEAM OR HOT WATER, OR GAS OR OIL FIRED

LATEST ADDITION TO KEWANEE LINE



TYPE C

STEEL WELDED BOILER

Type C Smokeless Series carries full rated load 2,300 to 32,000 feet of Radiation

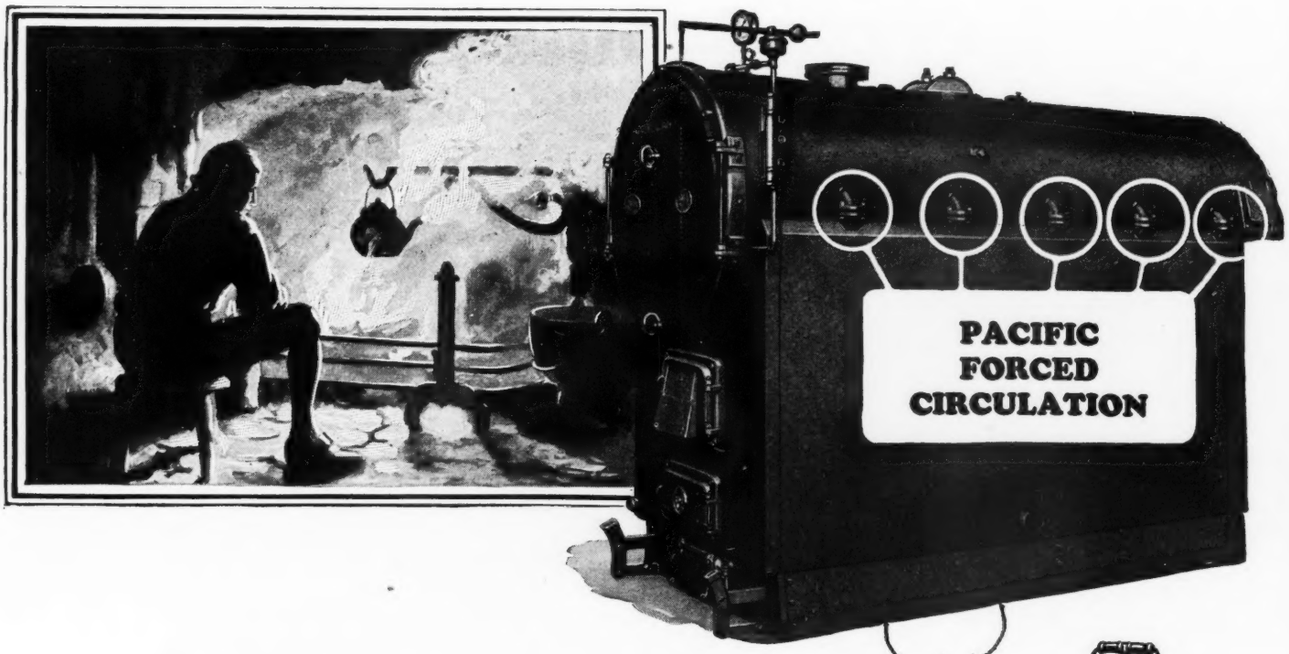
Catalog No. 84 gives the details

KEWANEE BOILER CORPORATION

KEWANEE, ILLINOIS

Branches in 40 Principal Cities

THE HEATING AND VENTILATING MAGAZINE, published by THE HEATING AND VENTILATING MAGAZINE CO., at 386 Fourth Avenue, New York, N. Y. Subscription rates: United States, $2.00; Canada, $2.50; Foreign, $3.00. Single copies, 30 cents. Vol. XXV, No. 9, September, 1928. Entered as second-class matter, April 18, 1925, at the Post-Office at New York, N. Y., under the Act of March 3, 1879.



Watt's Teakettle and Forced Circulation

Tradition says that the teakettle was Watt's inspiration for the remarkable inventions which led to present-day steam engineering.

But since the days of Watt there has been more than a century of progress. The principle of the teakettle—unrestricted circulation—has been discarded by up-to-date boiler engineers of today. For in Watt's teakettle they found a heat insulating effect due to the presence of steam bubbles.

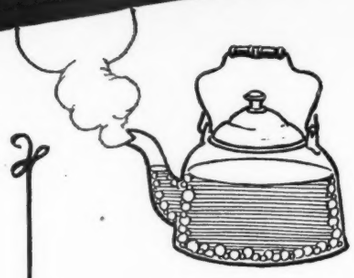
The modern idea in boilers is *forced circulation*, to break up these steam bubbles and speed up heat transfer. It's a fundamental principle in large power boilers noted for high efficiency — and Pacific engineers have applied it to Pacific Steel Heating Boilers. Between the firebox and shell are connections through which water and steam are forced, causing a scrubbing action on the heating surfaces which removes all steam bubbles and adds efficiency.

Forced circulation is but one of the reasons for the nation-wide leadership of Pacific Boilers in the heating field.

Write for catalogs and complete information.

PACIFIC STEEL BOILER CORPORATION
WAUKEGAN, ILLINOIS
BRISTOL, PA.

SALES OFFICES IN 58 CITIES
Division of U. S. Radiator Corporation, Detroit, Mich.



How Unrestricted Circulation Retards Heating

When heat is applied to a solid body of water contained in a boiler, steam bubbles form and cling to the heating surfaces, unless there is some force to break them up.

These steam bubbles are perfect heat insulators. They block the passage of heat from the fire to the water within the boiler, slowing up heating and reducing boiler efficiency and capacity.

In Pacific Boilers the heating surfaces are continually swept clean of steam bubbles by the forced circulation created in the connections between the firebox and shell, an *exclusive* Pacific feature.

STEEL HEATING BOILERS PACIFIC WAUKEGAN, ILL. BRISTOL, PA. TRADE MARK REG. U.S. PAT. OFF.

PACIFIC
STEEL HEATING BOILERS

Make sure that when your sales climb profits do not fall

Take a small roll of paper. Hold it slanting upward. Light it in the middle. Flames dart up and burn the upper half long before your fingers even feel the heat from fire creeping down. The Spencer Gable-Grate makes fire burn up-hill, the way it burns easiest and best.

Sugar poured from a spoon piles up in a heap. Take some away from the bottom of the heap. More rolls down. Coal does the same. Fire in the Spencer Gable-Grate takes fuel from the bottom of a heap. More rolls down by gravitation to keep the fire bed uniform.

You can increase your sales by getting more business, of course.

But how can you get more business?

You can make larger sales and certain profits by one simple selling plan. On every heating job submit an alternative bid on a Spencer Heater.

Any man who owns a home or building will be glad to pay the increased cost of a Spencer if you will show him how much it saves.

Show him the difference in cost between egg, stove and nut anthracite, and the low-cost fuels the Spencer is designed to use. Take No. 1 Buckwheat for instance. Explain that a Spencer gets as much heat from a ton of this low-cost fuel, as ordinary heaters get from more expensive sizes. Show men how they can save money by burning by-product Pea coke in a Spencer. Show them that Spencer Heaters are tested and approved for burning small sizes of any non-coking graded fuel at a big saving when compared with larger sizes.

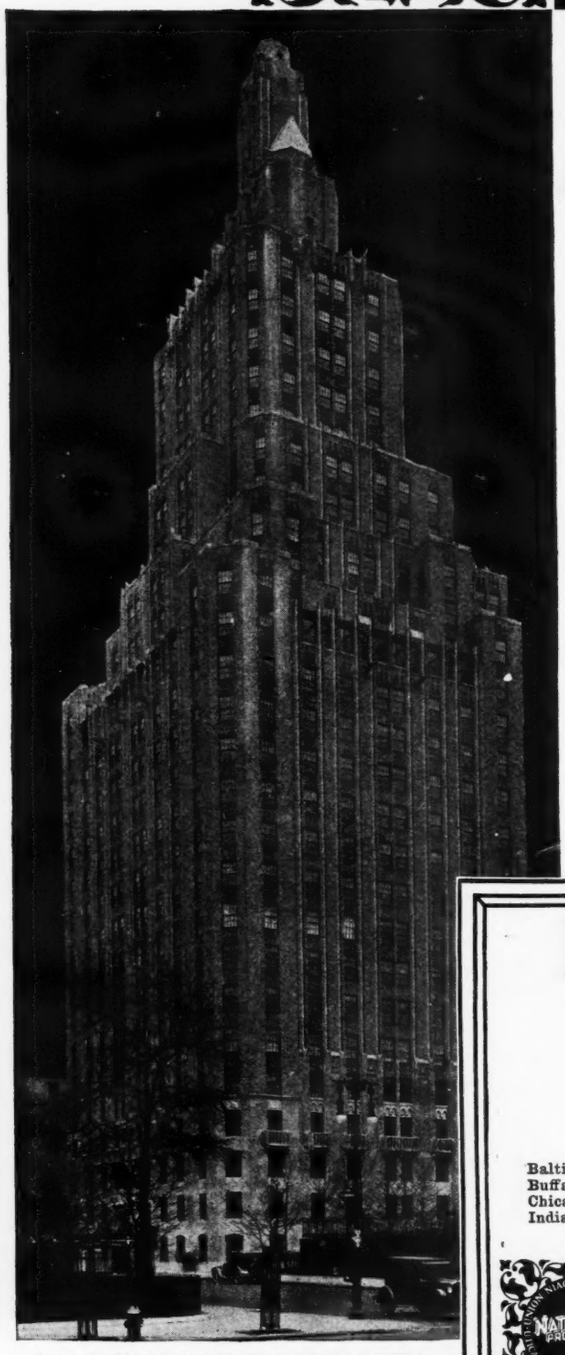
You'll get many a job, at a profit, that you would otherwise lose when let on price alone. That is how you lift your business above competition. The Spencer sells for more, and the larger the sale the larger the profit. You get all your profit, too, for you don't have to shave Spencer prices in competitive bidding. The Spencer is one heater in the field that will help you stand head and shoulders above competition.

Write for details of the new Spencer co-operative selling plan. Many heating contractors have found that they can multiply their income by using it. Spencer Heater Company, Williamsport, Pa. Division of Lycoming Mfg. Co.

SPENCER SAVES

SPENCER
steam, vapor or hot water
HEATERS

For THE FINEST BUILDINGS ...THE FINEST RADIATION..



No. 1 FIFTH AVENUE, NEW YORK

Architect, Helmle & Corbett
Heating Contractor, Chas. H. Darmstadt, Inc.
Builder, Jos. G. Seigel, Inc.

AERO
THE NATIONAL RADIATOR

In the years when Aero, the National Radiator, was the only complete line of tube-type radiation on the market, it was the almost invariable selection for the finest buildings. That was only natural.

Now, competing with many imitations, it is still chosen with amazing regularity. *That is significant.*

It indicates appreciation of the fact that Aero has, during more than six years, been rendering faithful, trouble-free service on heating applications of every character; and that it is the only complete line of tube-type radiation that can show so impressive a record of demonstrated dependability.

The man who selects Aero, the National Radiator, takes no gamble on the quality or on the satisfactory performance of his warming equipment.

NATIONAL RADIATOR CORPORATION

MANUFACTURER OF RADIATORS AND BOILERS

Nine Plants devoted to National Service through these Branch Offices and Warehouses :

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Philadelphia, Pa.—121 N. Broad St.
Pittsburgh, Pa.—1509 Arrott Building
Richmond, Va.—3032 Norfolk St.
St. Louis, Mo.—1042 Central Industrial Ave.
Washington, D. C.—2205 Fifth Street, N. E.
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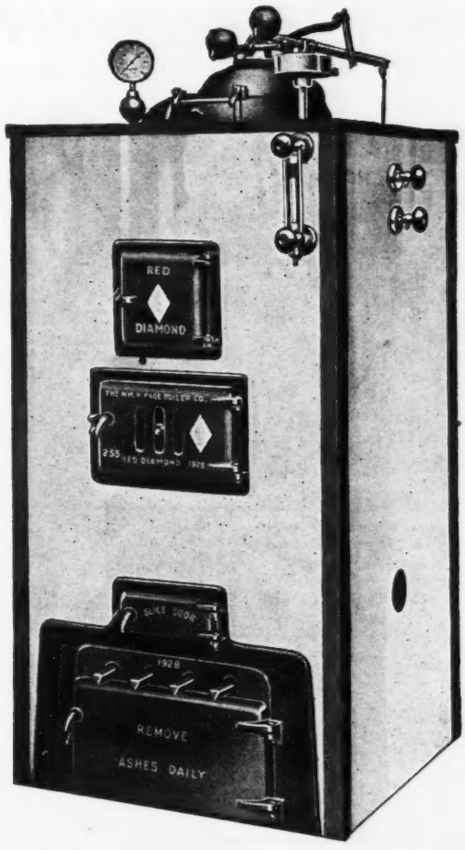
NATIONAL PRODUCTS

A. E. R. O. RADIATOR

Beauty and Efficiency



THE PAGE RED DIAMOND JACKETED BOILER is a re-creation in a new and beautiful form of a product tried and tested by time, built from the accumulated experiences of more than 70 years—a square cased round boiler. In this round boiler, which has made the name PAGE synonymous with heating satisfaction, there are provided large areas of grate and heating surface, two vitally important factors which make for ease of operation, and an abundance of warmth at a minimum outlay for fuel. Placed in the beautiful red enameled jacket, lined at top and sides with 1¼" improved air cell asbestos insulation, the result is not only a boiler pleasing to the eye, but one of exceptional power in the rapid generation of heat.

At a very moderate cost, the Red Diamond brings into the home a colorful heating unit of exceptional merit, and permanent, indestructible beauty.

Write for descriptive Pamphlet 54A, and most favorable prices.

The Wm H Page Boiler Co

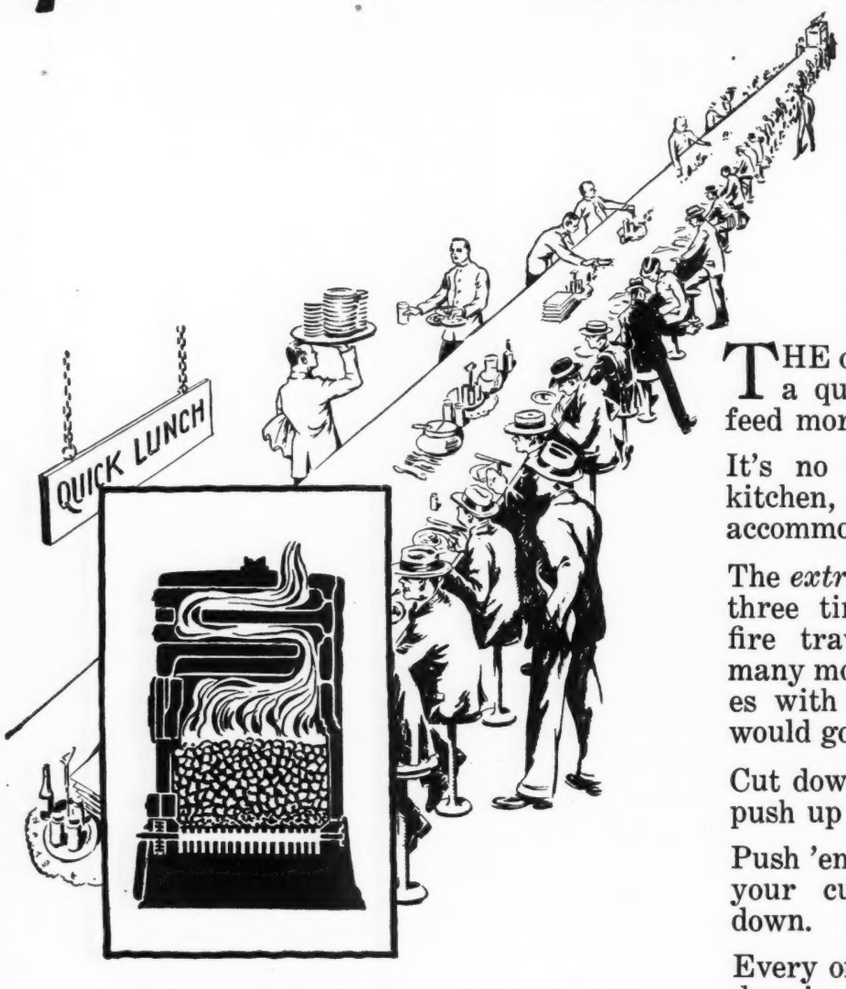
General Offices: 200 MADISON AVENUE, NEW YORK CITY

BRANCH OFFICES AND WAREHOUSES:

BOSTON, 123 Beverly Street
CLEVELAND, Rose Building
BROOKLYN, 98-49th Street
PHILADELPHIA, 1126 Washington Ave.
WASHINGTON, 1117-15th Street, N. W.
Factory, MEADVILLE, Pennsylvania

Burnham Boilers

The Longer The Counter The More It Will Feed



Here's a cross section of the typical Burnham Fire Travel.

All Burnhams have it. It's the long fire travel that makes the short fuel bill.

THE one sure way to make a quick lunch pay, is to feed more people quicker.

It's no use to enlarge the kitchen, if the counter won't accommodate enough stools.

The *extra* length of Burnham three times back and forth fire travel feeds just that many more heat hungry inches with heat that otherwise would go chimney scooting.

Cut down the scoots and you push up your profits.

Push 'em up because you pull your customers' fuel costs down.

Every one claims their boiler does just that. The difference is, the Burnham doesn't claim, but how it does *do*.

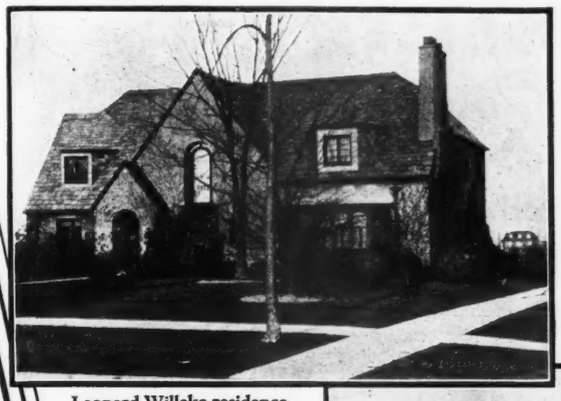
Send for Catalog 67 and put Burnham service to work for you

Burnham Boiler Corporation

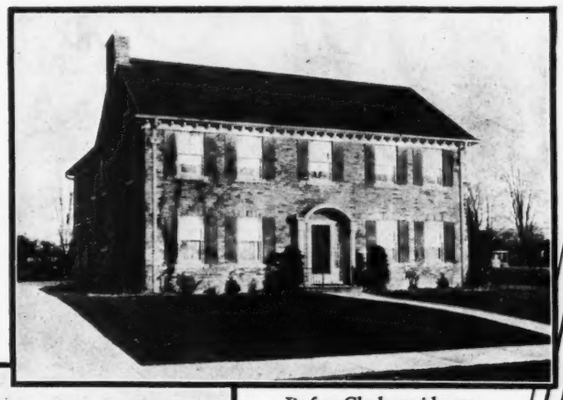
IRVINGTON, N. Y.

Representatives in all Principal Cities of the United States and Canada

ROSS STEEL BOILERS



Leonard Willeke residence.
Grosse Pointe Village,
Detroit, Michigan.
McConachie & Reid,
Heating Contractors.



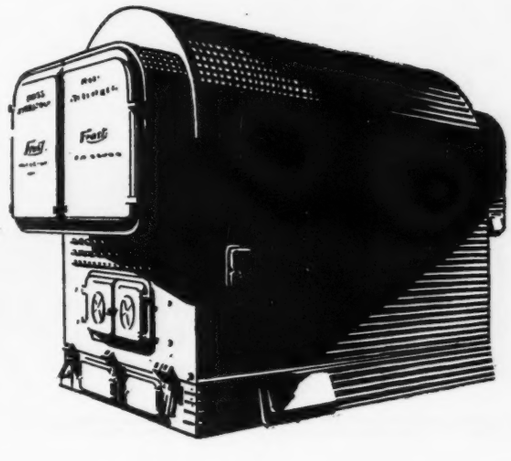
Rufus Clark residence,
Grosse Pointe Village.
Detroit, Michigan.
H. Buckeridge & Son,
Heating Contractors.

Oscar Webber residence, Grosse Pointe Shores, Detroit, Michigan
Harrigan & Reid, Heating Contractors.

The above photographs represent the type of homes that find ROSS STEEL HEATING BOILERS entirely satisfactory . . . . . .

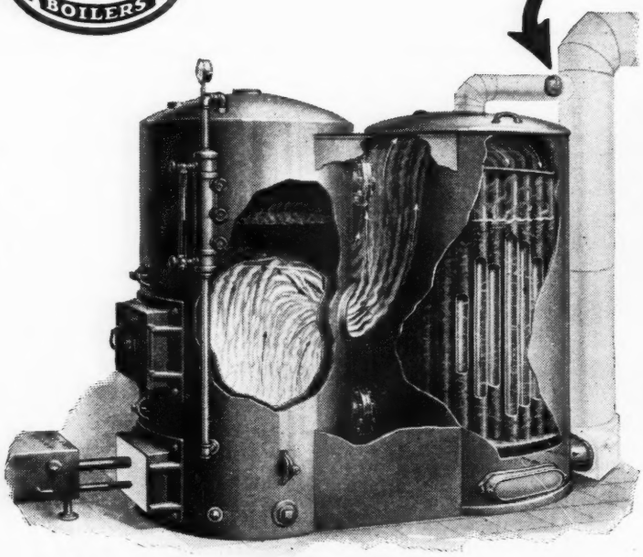
The Frost Manufacturing Co.
SINCE 1851

Branches in most leading cities. GALESBURG, ILLINOIS

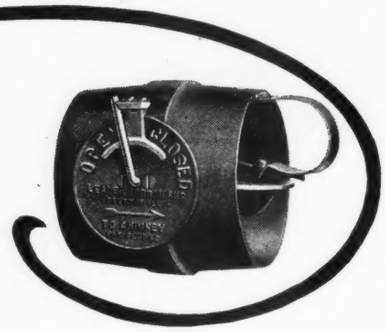


for Oil Burning—
KOOLSTACK BOILER
With Automatic Stack Temperature Control

Leader KOOLSTACK BOILERS



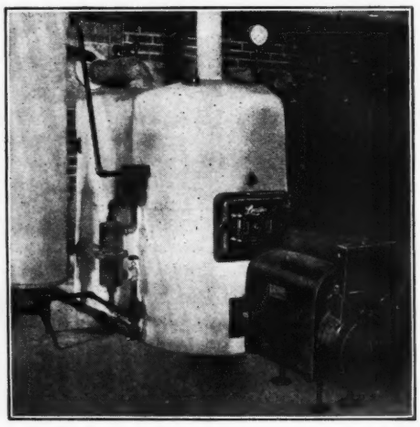
Cut-away View Showing Operation of a Koolstack



Automatic Temperature Control.
Arrow indicates its location on Boiler.

KOOLSTACK Boilers automatically maintain a chimney temperature of less than 300° F. This means economy in the burning of oil. Uniform low stack temperature is maintained by the Automatic Stack Temperature Control which is furnished with each Koolstack Boiler.

This control sends the heat direct to the chimney when the burner first cuts in. By the time the stack temperature has reached 250° F. the stack temperature control has closed automatically, causing the products of combustion to pass down through the rear section of the boiler.



Koolstack Boiler No. OW-2854 installed in the home of Mr. Howard Stewart, Clearfield, Penn., is shown at left.

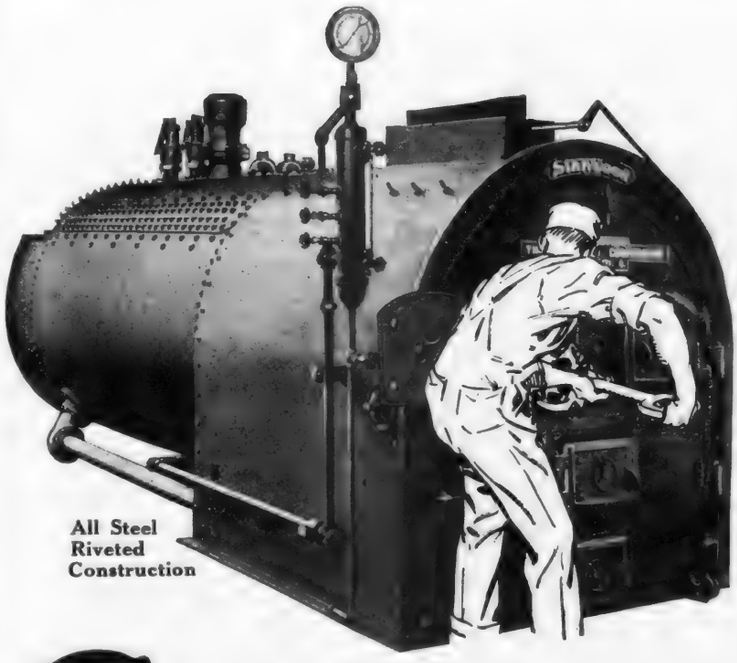
Why Burn 35% to 50% More Oil?

A TREMENDOUS AMOUNT OF INDIRECT HEATING SURFACE is contained in the rear section of the boiler. Koolstack Boilers contain more heating surface than any other boiler on the market today. Therein lies the secret of the amazing economy of Koolstack Boilers for Oil Burning.

Mechanical details and descriptive literature will be sent at your request.

LEADER IRON WORKS

2150 N. JASPER STREET DECATUR, ILLINOIS
21 East 40th Street, New York, N. Y.



Only a small amount of head room is needed for

Stanwood Smokeless Boilers

AVOID undue excavating by installing a Stanwood Boiler which only requires from 64 to 97 inches head room depending on the size of the boiler. Excessive excavating means higher installation costs. Absence of outside brickwork, in addition to the low head room necessary, reduces installation costs to a minimum.

The Stanwood further reduces heating costs by extracting every possible heat unit from the fuel. The down draft double grate system burns coal down to a minimum of ash. Rapid water circulation utilizes every heat unit practically possible from the fuel.

Nor is this all. Easy access to the inside of the boiler permits easy cleaning. Entire front opens like a door. Absence of mudlegs and staybolts prevents sediment accumulation and reduces cleaning operations to a negligible factor.

Regularly built in sizes from 29 to 250 H. P. (3500 to 31000 sq. ft. steam radiation) for working pressures of 15, 100, 125 and 150 lbs.

To understand more thoroughly the advantages and superior features of the Stanwood, write today giving the size and pressure desired.

The STANWOOD CORPORATION

Manufacturers also of Horizontal Return Tubular Boilers, Stacks, Breechings, Tanks, Feed Water Heaters, Throttling and Automatic Steam Engines

Established 1891 **CINCINNATI, OHIO**

Easy Reply COUPON

The STANWOOD CORPORATION,
Dept. D-98, Cincinnati, Ohio.

Please send full details of the Stanwood Boiler for working pressure of.....lbs. and.....H. P.

Name.....

Address.....

COIL

STEEL HEATING BOILERS
AND WATER HEATERS

FOR
OIL
BURNING

All of those features, so necessary to the proper and most economical use of oil as a heating fuel, will be found in the Coil Steel Heating Boiler.

This boiler has been so designed that in actual installations it is saving users from 25% to 40% of their former fuel bills.

Isn't this boiler worth your investigation—in your own interests as well as those of your customers?

Write for full details of the Coil line of Steel Heating Boilers and Water Heaters.

MONITOR BOILER COMPANY

1505 Race Street PHILADELPHIA, PA.

One of Michigan's foremost Cleaning and Dyeing Establishments

¶ Titusville Boilers were chosen for their ideal adaptability to meet every requirement.

¶ The unusual fuel economies possible with Titusville designed Boilers, the excellent riveted construction and remarkable working efficiency were the main factors that governed the selection of Tico Boilers for this ultra-modern cleaning and dyeing plant — one of Detroit's finest establishments.

¶ When *you* need a new up-to-the-minute Boiler, think of Titusville—the Boiler with an established national reputation.

THE TITUSVILLE IRON WORKS COMPANY
TITUSVILLE, PENNA.

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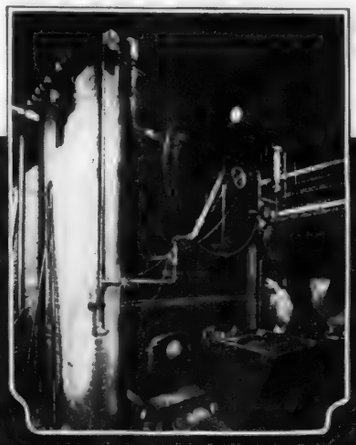

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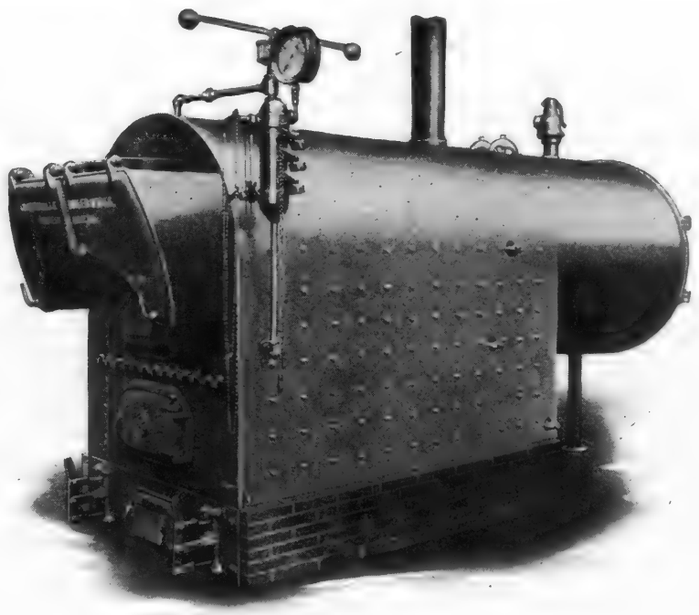
TITUSVILLE BOILERS



Announcement

Effective as of August 1st, 1928, the well-known line of COATESVILLE ALL-STEEL PORTABLE FIREBOX HEATING BOILERS will be Distributed by the NATIONAL RADIATOR CORPORATION. The Sales and Service Facilities offered by this nationally known organization are well known wherever Heating Boilers are specified, sold, or used.

Coatesville All-Steel Heating Boilers are the embodiment of nearly 50 Years of Boiler Making Experience—in fact, Coatesville was one of the first concerns to produce such a Boiler, back in 1892.

Manufactured by

COATESVILLE BOILER WORKS, COATESVILLE, PA.

Philadelphia 111 S. 15th St. | Pittsburgh Union Trust Bldg. | New York 30 Church St. | Baltimore Lexington Bldg. | San Francisco 945 Pine St. | Boston 141 Milk St. | Newark 60 Park Place

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Ten plants devoted to National Service through these Branch Offices and Warehouses:

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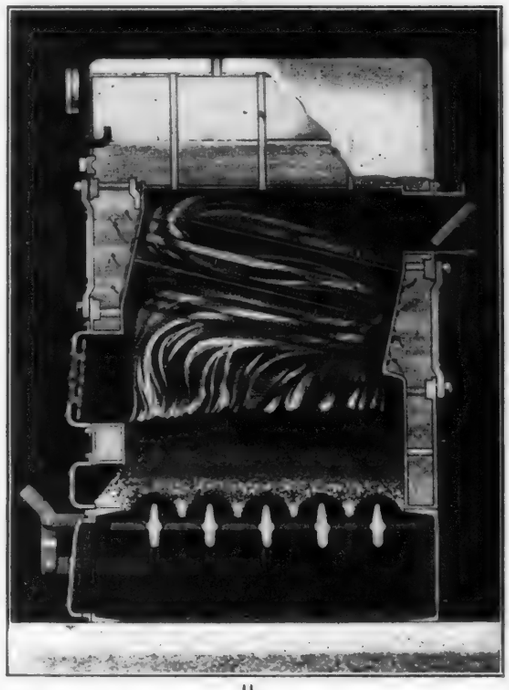
Chicago, Ill.—2445 N. Keeler Avenue Cleveland, Ohio—935 E. 63rd Street Omaha, Neb.—108-112 S. Tenth St. Philadelphia, Pa.—121 N. Broad St.
Cincinnati, Ohio—Spring Grove and Elmira Avenue Pittsburgh, Pa.—1509 Arrott Building
Indianapolis, Ind.—431 W. Georgia Street Johnstown, Pa.—221 Central Ave. Richmond, Va.—3032 Norfolk St. St. Louis, Mo.—1042 Central Industrial St.
Washington, D. C.—2205 Fifth Street, N. E.

KNOWLTON WATERTOOB STEEL BOILERS

Use Coal in Knowlton "Watertoob" Boilers



Then you will have complete satisfaction in—economy—rapidity of heating—attention. The "Copper" water tube construction does it.

Write for booklet "Complete Heating Satisfaction" which tells the rest of the KNOWLTON *Story.*

ORR & SEMBOWER, Inc.

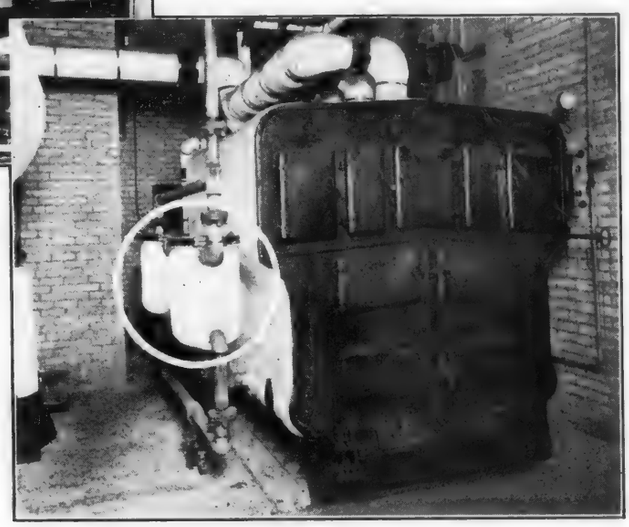
Reading, Pennsylvania

(Established 1885)

208 N. Clinton St., CHICAGO 50 Church St., NEW YORK

The BETTER BUCKWHEAT BURNER

At least half, perhaps three-quarters, of hot water heating costs can be saved by connecting Excelso Water Heaters.



Exceptional Economy in Water Heating Costs for Big Buildings

Open view of Triple Coil EXCELSO Indirect Heater showing patented ground joint brass connections.

HUNDREDS of dollars of hot water heating costs are being saved operators of apartments, hotels, business and office buildings by employing Excelso Water Heaters. They burn no fuel of themselves but work in connection with the steam or vapor heating boiler. Whether these are fired with coal, gas or oil makes no difference, nor does the season—for summer and winter alike Excelsos save all the care and most of the cost of heating water.

Write for booklet showing fourteen typical installations

Excelso Products Corporation
DIVISION OF AMERICAN RADIATOR COMPANY
59 Clyde Ave., Buffalo, N. Y.

NATIONALLY DISTRIBUTED BY LEADING WHOLESALERS AND BOILER AND RADIATOR MANUFACTURERS

EXCELSO WATER HEATERS
Sold by All Plumbers and Steamfitters

Presenting the Masterpiece of Residence Boilers

the Capitol Red Cap

A full-color spread in the September 15th Saturday Evening Post and pages in four other national magazines announce the crowning achievement of our thirty-eight years—the Capitol Red Cap—built upon the precise principle, the identical design, that has been tried and proved in homes from coast to coast.

The Capitol round boiler, with a snugly fitting round jacket, scientifically insulated, now stands in symmetrical beauty, trim and graceful, every line refined even to the door hinges. Cloaked in cobalt blue, capped with cardinal red, it is finished in baked enamel as finely as a Rolls Royce fender. A wipe of a cloth will remove every vestige of dust from its mirror-smooth surface.

A thick blanket of rock wool, more costly and effective than any insulation used heretofore on jacketed boilers, insulates it.

Moreover, Capitol guaranteed heating scientifically and automatically selects the right-sized Capitol Red Cap to properly warm every home.

This written warranty leaves nothing to chance, avoids the selection of too large a boiler, eliminates the danger of one too small to meet the emergency of drops in temperature.

The Capitol Red Cap, like all Capitol Boilers and Radiators, is sold and installed only by responsible heating contractors. They are our only sales agents. Their skill in installing supplies the final assurance of satisfaction in the masterpiece of residence boilers, the Capitol Red Cap.

UNITED STATES RADIATOR CORPORATION DETROIT MICHIGAN

8 Factories and 33 Assembling Plants. For 38 years Builders of Dependable Heating Equipment

Guaranteed Heating WITH

Capitol Boilers

AND RADIATORS

EQUITABLE TRUST COMPANY BUILDING
NEW YORK CITY
Architects: Trowbridge & Livingston, New York City
Engineers: Meyer, Strong & Jones, New York City
Plumbing Contractors: W. G. Cornell Company, New York City
Heating and General Contractors:
Thompson-Starrett Company, New York City

NATIONAL

AT THE WORLD'S FINANCIAL CENTER

Across the street from where the first President of the United States took oath of office, and on one of the most valuable pieces of land in the world, a new and magnificent structure now towers far into the air.

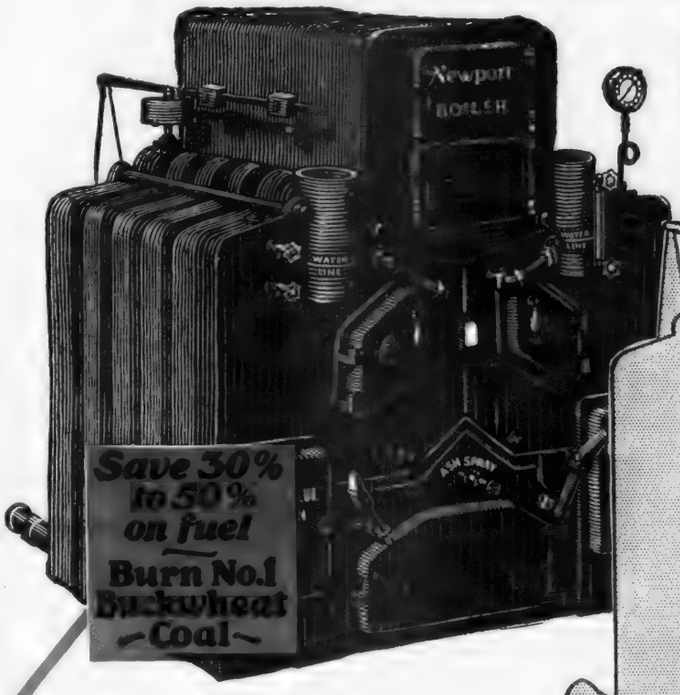
Within the shadow of its casting are the world's most famous financial headquarters. Here will stand another landmark created by master minds of the architectural and engineering professions—emphasizing modern beauty and efficient design.

Responsibility for such structures rests heavily. Every selection of materials will challenge the wisdom of their sponsors as time determines their service quality, adequacy and durability. Many miles, many tons, of "NATIONAL" Pipe have now become an integral part of this building. The reputation for general dependability, consistently appearing throughout tubular history from the earliest days of pipe making, gives every promise that this piping bears the same ratio to successful performance as the building itself.

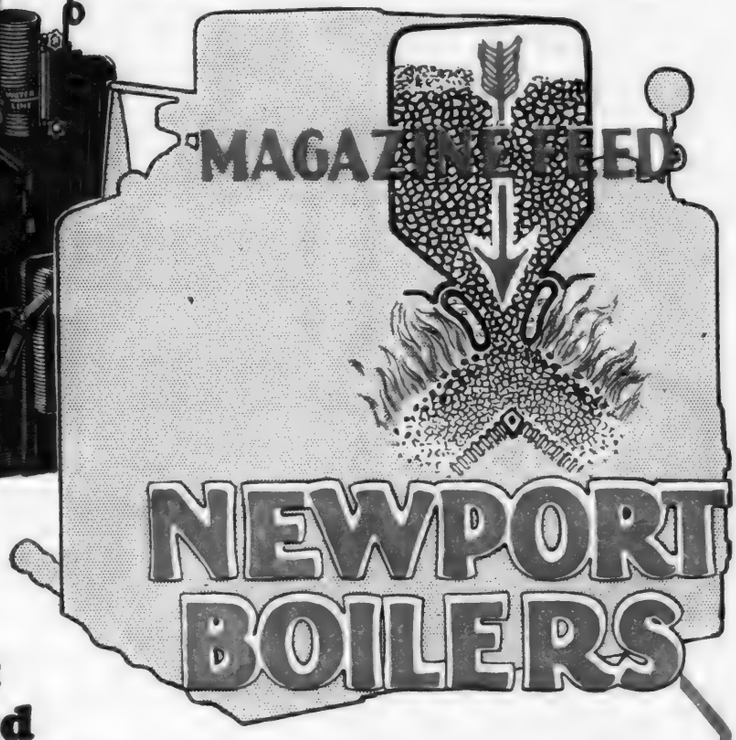
NATIONAL TUBE COMPANY, PITTSBURGH, PA.

District Sales Offices in The Larger Cities

Newport Supplies Public Demand *for* Convenience *at* Low Cost

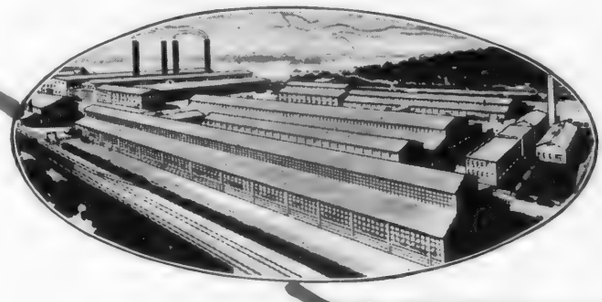


Today's public wants and expects more convenience than yesterday's. Newport's Magazine Feed supplies it, with better control of heat, using fuel that sells from $5 to $7 less per ton.



Use Newport Magazine Feed to win New Contracts

Why try to sell boilers that are like everything else? Sell your prospects the *different* Newport. To them, its difference means matchless convenience, economy, heat control. To you, it means a bigger profit on the installation.



Not how many sales but how much profit

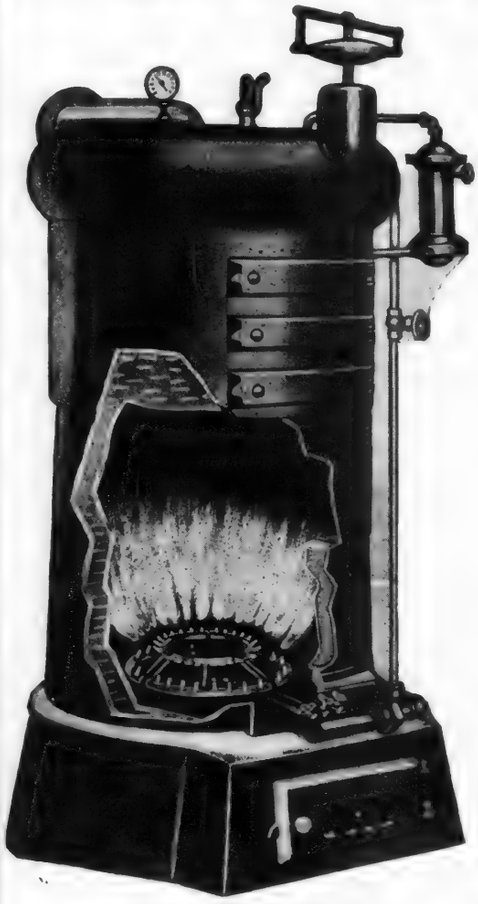
Get out of the rut of "Profitless Prosperity." Lots of contracts and activity don't mean a thing if profits are small. Selling Newports will get you contracts that will bring you good profits, and bring your customers real satisfaction.

Other contractors are using our suggestions to get more contracts at a better profit. Write us for complete information, also for copy of our book, "The Practice of Scientific Heating."

NEWPORT BOILER COMPANY
(*Division of Hart-Parr Company*)
GENERAL OFFICES
529 S. Franklin Street -:- Chicago, Illinois
Distributors in all principal cities of the United States and Canada

15 Successful Years — Exclusive Patented Features — Unlimited Manufacturing and Distributing Facilities.

All Homes are Your Prospects



Above illustrates a No. 3-R-17 Barber Burner properly positioned in a round boiler. The same idea is carried out in a round warm air furnace. Barber Burners are furnished in sizes and capacities for any type boiler or furnace.

Thousands of Installations of

BARBER Patented JET GAS BURNERS

Will be Sold During the Next Few Months!

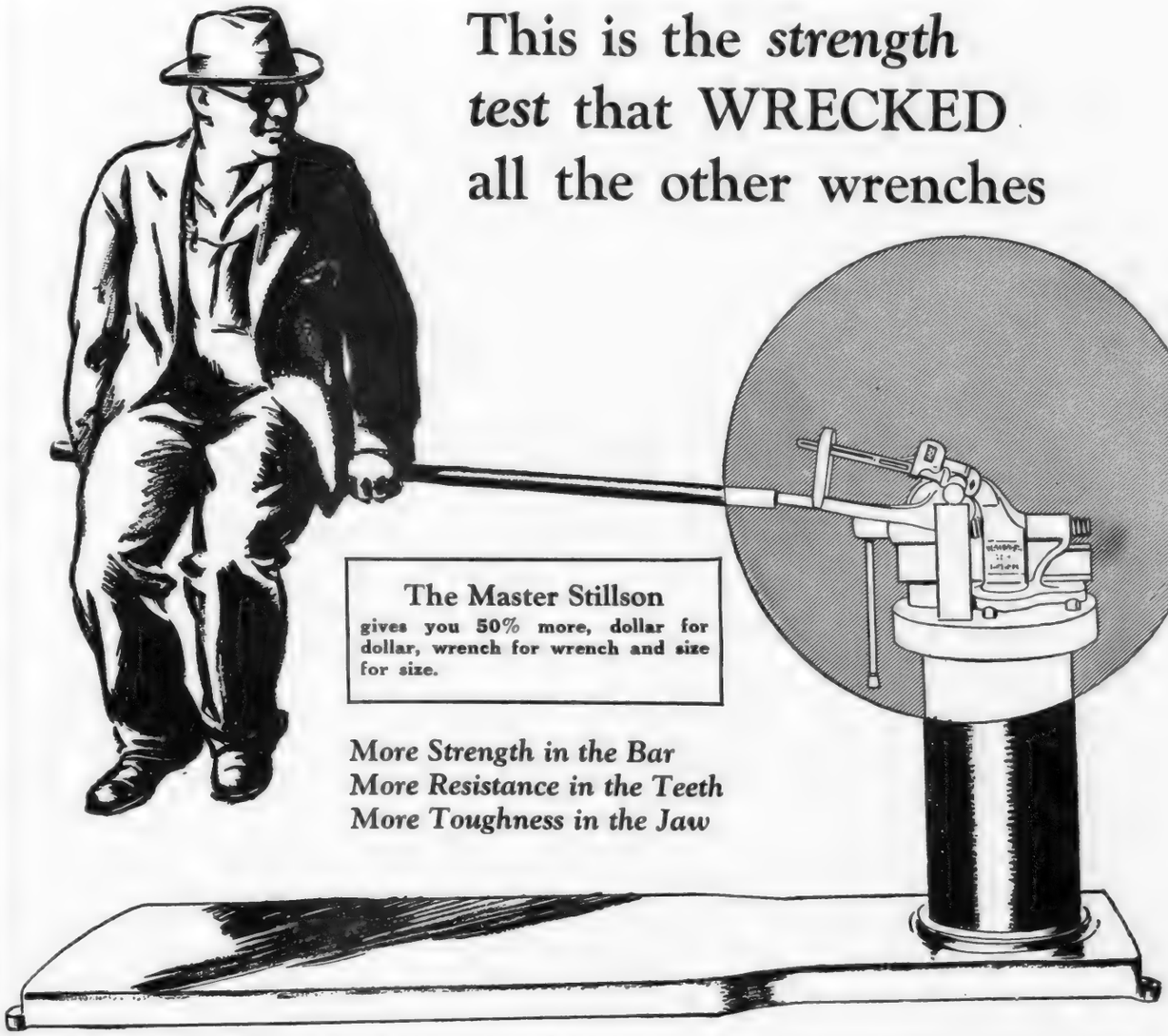
Start right now to get your share of this very profitable business. If you have not received our Catalogue No. 28, write for it to-day. It is practically a text-book on "conversion work." Get our demonstrating outfit, shown on Page 10 of the catalogue, and set it up in your showroom. With it you can easily show the "how" and "why" of Barber CONVERSION Burners, and convincingly demonstrate their superiority over all other types of burners.

Get our Window Display Signs—they will create many inquiries that will result in sales. Get our circulars and broadsides for mailing to your prospective customers—and our mats for your local newspaper advertisements. Get all these Sales Helps and start your campaign at once.

Hundreds of your customers are waiting for you to convert their coal burning furnaces and boilers to gas. We repeat—start after this very profitable business right now.

***The* CLEVELAND GAS BURNER & APPLIANCE CO.**
Burner Specialists
3102-04 Superior Avenue, Cleveland, Ohio

This is the *strength test* that WRECKED all the other wrenches



The Master Stillson
gives you 50% more, dollar for dollar, wrench for wrench and size for size.

More Strength in the Bar
More Resistance in the Teeth
More Toughness in the Jaw

NO living man can break or even bend a new Walworth Master Stillson under ordinary conditions. We soon discovered this when we were testing the strength of this new wrench at the Walworth works.

First we tried hanging weights on the handle of a wrench with its grip set on a steel bar. All that happened was that we ran out of weights.

Then we rigged up this testing block with a six-foot lever. Weight applied at the end of the lever is multiplied 7.5 times on the handle of this wrench in the normal position of use.

A 225 lb. man sitting on the end of the lever bent or broke every competitive wrench that was tested. The same test left the same size of Walworth Master Stillson absolutely undamaged in any way.

These are the plain unvarnished facts which you can prove to your own satisfaction by trying out the Master Stillson side by side on the job with any other wrench you may now be using.

WALWORTH

Walworth Company, General Sales Offices: 51 East 42nd St., New York
Plants at Boston, Mass.; Kewanee, Ill.; Greensburg, Pa., and Attalla, Ala.

Distributors in Principal Cities of the World

Walworth International Co., 11 Broadway, New York, Foreign Representative
Walworth Company, Limited, 10 Cathcart Street, Montreal, P. Q.

MASTER TRADE MARK STILLSON REGISTERED U.S. PAT. OFF. **STILLSON**

Working Overtime

Although the selling season for oil burners has not yet reached its peak our factory has already been forced to overtime to supply promptly the demand for

AUTOMATIC OIL BURNER

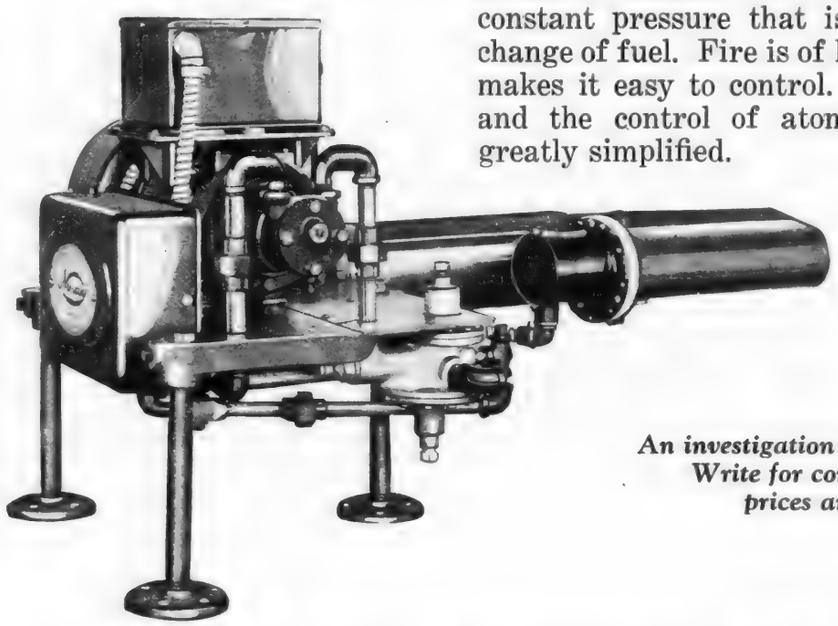
Nu-way

FOR HOME HEATING

Automatic Oil Burners

Dealers are reporting from all over the country that the 1928 Nu-Way is the easiest oil burner to sell that they have ever come in contact with. In most cases a demonstration makes the sale.

This popularity is accounted for by several sales features. It is more quiet—all flame roar is eliminated. It is more simply constructed—now built in one unit instead of three. It has no extra pump. It has a constant fire size, the result of a constant pressure that is not affected by change of fuel. Fire is of low velocity which makes it easy to control. It burns less oil and the control of atomizer pressure is greatly simplified.



An investigation will convince you. Write for complete details, prices and terms.

The Nu-way Corporation, Rock Island, Ill.

At the first Touch of Winter—

Your Customers think of Heating Comfort...!

AND you can give it to them with Hot Water Heat—*Thrush equipped.* Offer them a controlled pressure system—and at a price your competitor will probably ask for an ordinary gravity job, unregulated, of equal specification. Your jobber can tell you about *Thrush System* and the possibilities of building bigger, better business with it.

Put the Thrush Sales Plan to work for ...you!

You can tell your customers how Thrush System provides more home comfort, assures satisfactory heating at all outdoor temperatures, saves 20% to 50% of fuel year after year, prolongs firing periods; how simple it is to operate; how it saves space because the expansion tank goes in the basement; how it removes all danger from overflow or freezing of the tank—do it quickly and easily by using Thrush dealer helps. There are folders, posters, newspaper ads—all ready for you—folders furnished with your own name imprinted on them. Ask about it—use the coupon now.

H.A.Thrush & Co.
Peru, Indiana.

H. A. THRUSH & CO., Peru, Indiana
Gentlemen: _____ 19___
Please tell us how you help us interest the home owner in Thrush Equipment to make our sales easier. Send illustrated catalog.

Name _____
Address _____
City _____
State _____

THRUSH SYSTEM
OF HOT WATER HEATING

A NEW DAY *in* OIL BURNER SELLING

NEW OPPORTUNITY FOR PROFITS, FOR SALES AND FOR COMMON SENSE METHODS

1 The most complete line of oil heating equipment the industry has seen.

2 The Kleen Heet "Challenger" Model—for homes of from 4 to 8 rooms—at a lower price than has ever before been possible for equipment of this character. Just announced—*but already a sensation in the industry.*

3 A truly epochal reduction in inventory and service requirements.

4 A program of sales-cooperation, that will appeal to every sound business man in the retail field.

For the right kind of men and firms, some dealer franchises are still open. Prompt action now will be to the advantage of those who are qualified.

THE WINSLOW BOILER & ENGINEERING CO.
844 RUSH STREET CHICAGO

makers of

Kleen-Heet *with* **Oil**

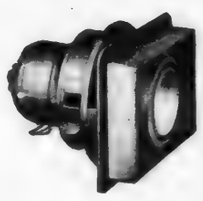
NOW

For the First Time in Oil Heat History!

A Size for Every Job
A Type for Every Requirement
A Price for Every Purse

Model N

IN the original Nokol laboratories, the modern system of automatic oil heating was born. And now the American Nokol Corporation, larger and stronger than ever through twelve years of successful development, gives to the world the *first complete line* of automatic oil heating systems.

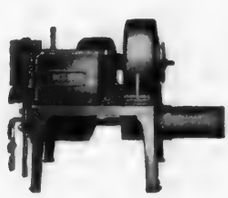


Model GR

The Nokol Dealer to-day has at his command every effective type of automatic oil burner. He is prepared for any size job, for every requirement of heating plant, and for variable factors of any kind in oil or power supply, with burners priced at the *lowest figure* consistent with high standards of manufacture and complete dependability!

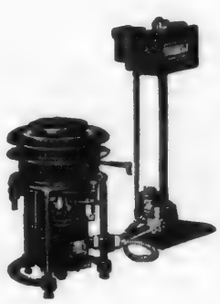
Model L

In place of prejudiced salesmanship, he can to-day give unbiased engineering counsel which places his recommendations on the same plane as those of a trusted physician or attorney. Not being confined to any one model of burner, he alone is in a position to recommend and sell the one which best suits the requirements of the customer . . .



Model G

An unlimited market lies before you! An amazing opportunity for profit and most valuable service to the heating needs of your community! Let us give you all the facts . . . to-day!



Model R

American Nokol Corporation

4229 Schubert Ave., Chicago, Ill.

NEW NO COAL
Noiseless Nokol
REG. U.S. PAT. OFF.
CLEAN AUTOMATIC OIL HEAT

American Nokol Corporation,
4229 Schubert Ave.,
Chicago, Ill.

Without obligating me in any way, please send me complete information on the new complete Nokol line and franchise.

Name_____

Address_____

City_____ State_____

Reach This *Unlimited* Market

PROFITABLE installation jobs are possible *everywhere* with Clow Gasteam Radiators. Any place — from the Gulf to the Great Lakes. Any job — from a huge warehouse to a tiny suburban station — or a private home — or any job. (Illustrations are of more unusual jobs — private homes, etc., are not shown here.)

Why — look at the installations right here! Twenty-six of them — all different — every type of climate — all Clow Gasteam equipped. Think of the profits on these jobs that are "going Gasteam."

Clow Gasteam Radiators handle dry Texas weather just as efficiently as they perform in Illinois

JAMES B. CLOW & SONS, 211 N.

CLOW GASTEAM

A. G. A. and Underwriters' Laboratories Approved

STOCKED IN EVERY SECTION OF THE COUNTRY

with CLOW GASTEAM!

or Massachusetts. Their endless versatility makes them *national*. In any place–in any climate they can mean installation jobs for you.

You're missing something if you're not pushing Clow Gasteam. Every heating contractor and engineer should know this practical heating system. Get information on Clow Gasteam Radiators right away. Write today for our new book, *economical gas heating*.

Distributing Points for Clow Gasteam Radiators

Amarillo, Texas	Lexington, Ky.
Baltimore, Md.	Little Rock, Ark.
Birmingham, Ala.	Los Angeles, Calif.
Boston, Mass.	Louisville, Ky.
Brooklyn, N. Y.	New Orleans, La.
Buffalo, N.Y.	New York City
Charleston, W.Va.	Oakland, Calif.
Chicago, Ill.	Oklahoma City
Cincinnati, O.	Parkersburg, W.Va
Clarksburg, W.Va.	Pasadena, Calif.
Cleveland, O	Philadelphia, Pa.
Columbus, O.	Pittsburgh, Pa.
Dallas, Texas	St. Louis, Mo.
Denver, Colo.	San Antonio, Tex.
Detroit, Mich.	San Diego, Calif.
Ft. Worth, Texas	San Francisco, Cal.
Fresno, Calif.	Santa Barbara
Houston, Texas	Shreveport, La.
Huntington, W.Va.	Tampa, Fla.
Jacksonville, Fla.	Toledo, O.
Kansas City, Mo.	Tulsa, Okla.
Washington, D. C.	

Talman Avenue, Chicago

CLOW GASTEAM

A. G. A. and Underwriters' Laboratories Approved

STOCKED IN EVERY SECTION OF THE COUNTRY

Trouble-Free Service month after month

.... A Webster Reputation!

WHEREVER oil burners are put to real month-after-month working tests, you'll find Webster Ignition Transformers supplying dependable ignition . . . Prominent oil burner manufacturers have adopted it as standard equipment because of the remarkable service records it has established . . . Webster Transformers are uniformly reliable, and can be supplied to meet the great variation in voltage and frequency existing in many communities . . . Full details of its efficiency, economy, and durability will be sent at your request . . . Professional advice is given gratis.

WEBSTER ELECTRIC COMPANY
RACINE, WISCONSIN
"Specialists in Oil Burner Ignition"

Webster Ignition Transformer

The Webster Ignition Transformer can be furnished with either single or double high tension terminals, for a variety of voltages and frequencies.

KNOW ELECTROL BY THE HOMES IT HEATS

Two views of the residence of Mr. P. K. Hudson at Great Neck. Heated by Electrol.

Upper view—Front Elevation. Lower view—Rear Elevation.

Correct Installation is Part of the Purchase

HEATING engineers and contractors may be certain when Electrol automatic oil heat has been selected, that the burner will be correctly installed.

The dealer's installation men are trained at the factory. They have a thorough knowledge of the correct method of fitting Electrol to each type of heating plant. Correct installation is always an inherent part of the purchase when Electrol is sold.

Following rigid operating tests at the factory, Electrol burners are shipped to the dealers completely assembled. There is no reassembling in the dealer's shop or on the job. The work of the installation men is simplified, and there is double assurance of dependable operation.

A Good Burner to Recommend

You may approve the choice of an Electrol burner or recommend it yourself secure in the knowledge that it will make good and live up to all expectations.

Likewise, you can depend on the Electrol dealer to respect and protect your professional judgment. For instance, the Electrol dealer will not sanction an Electrol installation or proceed with the job unless he has determined in advance that the burner will give complete satisfaction in the existing heating plant.

Quiet... All Electric... Entirely Automatic, Electrol is as fine as engineering skill and exceptionally strong financial resources can produce. It is the oil burner with *The Master Control* an ingenious and exclusive device which watches over every phase of the burner's operation, safeguarding comfort day and night.

An Opportunity for Profit

You can effect working arrangements with the Electrol Sales and Service Representative in your city whereby you will be able to co-operate with each other to your mutual advantage.

Without any investment on your part, it is possible for you to make money on the sale of Electrol burners. . . . Any Electrol dealer will be glad to explain the details of this offer and show you how you both profit by working together. If you do not know the address of the nearest Electrol dealer, let us put you in touch with him. No obligation involved, of course and a talk with our Sales and Service Representative may open a new source of income for you.

We shall be glad to send literature and full information on this fine oil burner. Write or send the convenient coupon below.

ELECTROL INCORPORATED
177 Dorcas St. • • St. Louis, U. S. A.

A Size for Every Job

Electrol is made in three sizes, models TJ, T and TD with ranges respectively from 200 to 800, from 600 to 3000, and from 2000 to 8000 square feet of steam radiation including piping and risers or equivalent.

A New Income for You

Profitable arrangements can be made with the Electrol Sales and Service Representative in your city whereby you can increase your income from the sale of Electrol burners. Let us or the dealer give you full particulars.

ELECTROL

The OIL BURNER with *The Master Control*

Listed as Standard by the Underwriters' Laboratories, and bears their label.

Member of the Oil Heating Institute

Electrol Inc. *of* Missouri
177 Dorcas St., St. Louis, U. S. A.

Gentlemen: Please send complete details of Electrol Oil Burner ☐. Who is your nearest dealer ☐.

Name.....

Address.....

City..... State.....

Greater Heating Efficiency at Lower Cost . . .

Massachusetts
Type H Unit Heater and
Recirculating Box for floor mounting

Massachusetts
Type H Unit Heater
Inlet Side

Massachusetts
Type V. F. Unit Heater
showing arrangement of filter cells

WHERE certain apparatus is installed with a view to economy, the saving in many instances does not begin until the installation is put into operation. In many cases where the installation has been made at a high initial cost the real economy does not take place for a long period, until the increased cost of installing, etc., has been made up.

With the Massachusetts Unit Heater, economy starts at the very beginning. Not only is there a greater increase in heating efficiency but a big saving in installation.

The Massachusetts Type V Unit Heater (Floor Type) draws cool air from a point just above the floor level, and discharges it horizontally at high velocity just above the breathing or working zone. The air inlet, being just above the floor line, removes the lower strata of cool air, allowing the warmer strata in the breathing zone to fall, thus insuring a uniform temperature.

Massachusetts Type V. F. Unit Heater

Bishop & Babcock engineers pioneered the first unit heater for industrial use fitted with a means of filtering and purifying the circulated air.

The illustration shows the easy manner in which the filter cells are removed for cleaning and recharging. Dirty cells may be removed and clean cells substituted without interfering with the operation or efficiency of the unit.

Massachusetts Type H Unit Heater

For installations where floor space is not available, we recommend Massachusetts Type H Unit Heaters, arranged for ceiling suspension. These units can be furnished with deflectors and recirculating boxes if required.

Massachusetts Type H Unit Heater and Recirculating Box

With recirculating boxes the cool strata of air is taken from a point just above the floor level, drawn up through the vertical recirculating box and discharged above the breathing zone in a horizontal plane. This insures uniform, efficient heating, and prevents overheating in the upper areas.

MASSACHUSETTS BLOWER DIVISION
of
THE BISHOP & BABCOCK SALES CO.
General Offices - 4901-4915 Hamilton Ave. N.E.
CLEVELAND, OHIO.
OFFICES IN PRINCIPAL CITIES

Put the boiler water line in good hands

IT'S a lot easier to remember *once* to install or specify the new McDonnell & Miller Self-Cleaning Duplex Feeder, than to expect some one to continually remember the boiler water line. The boiler without a duplex feeder is as frail as the human memory. Forget once to turn the feed valve on at the right time, and it means cracked sections or a burned boiler. Forget to turn it off, and it means flooded boilers and cold buildings.

Hundreds of boiler owners have found that the cheapest insurance against this expense and inconvenience is the McDonnell & Miller Duplex Feeder.

New in everything but experience—

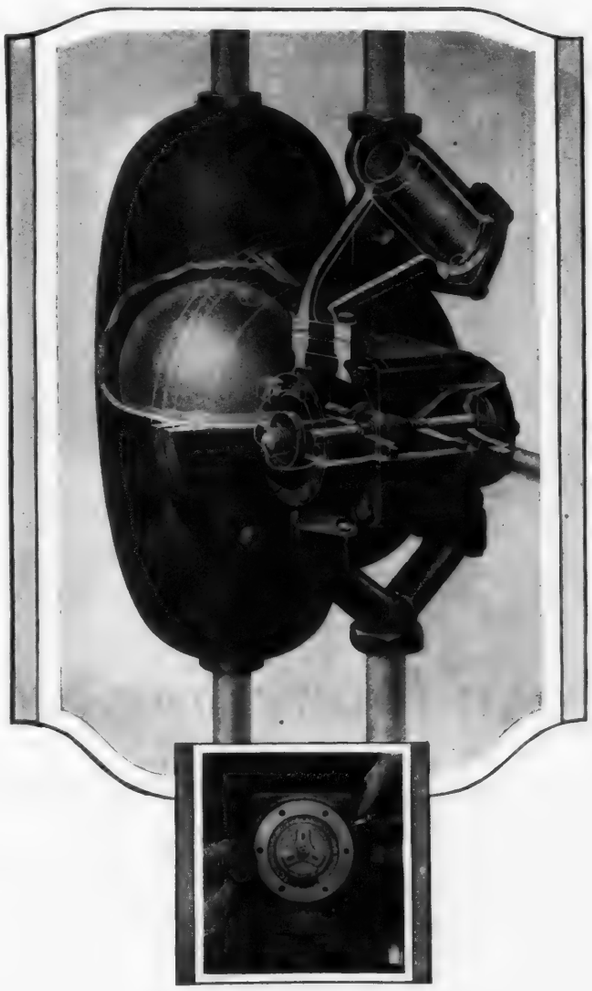
In the new *self-cleaning* McDonnell & Miller Feeder they have found *absolute protection.* It is the first feeder to have rotary self-cleaning valves—the first feeder to have capacity sufficient to supply the requirements of *any* heating boiler—the first feeder to have adjustable water levels and differentials—the first feeder to give perfect performance without cleaning regardless of the hardness of the feed water.

The "Rolls Royce" of feeders—

When you look at this feeder you see a totally new standard of feeder design and construction. It has only one float—only one moving unit. The feed water does not enter the feed chamber but is fed with full city pressure behind it, exactly as if the feed-valve were manually operated. The fewer parts are made with machine-tool precision. Each feeder is factory tested under actual operating conditions before shipment. It is built for *continuous* unfailing service—and *gives* it.

McDONNELL & MILLER
710 Wrigley Bldg., Chicago

McDONNELL & MILLER
SELF-CLEANING
Duplex Feeder
"Doing one thing well"



"Valves that stay new"—

The rotary, cast-bronze valve-discs turning on monel seats, "work in" to a better and better seat with every movement of the float.

Fully adjustable—

Water line can be changed to one inch higher or lower *after* installation is made, and differential between supply level and overflow level may be set at 1, 2, 3, 4 or 5 inches.

Facts that you should have—

The interesting description of the operation of this new feeder, and remarkable facts about actual operating records, are covered by a new 8-page booklet. This booklet also contains capacity curves and installation data that every engineer should have. Just mail the coupon for your copy.

McDONNELL & MILLER
710 Wrigley Bldg., Chicago
Please send 8-page booklet containing capacity curves and other data.

Name and title .....

Address .....

.....

Company H9

SEE OUR CATALOGUE IN SWEETS

FIRST SECTION OF STARKS BUILDING

D. H. Burnham & Company; Chicago; *Architects*

Newbury Electric Company; St. Louis; *Heating Contractors*

SECOND SECTION OF STARKS BUILDING

Graham, Anderson, Probst & White; Chicago; *Architects*

F. A. Clegg & Company; Louisville; *Heating Contractors*

An Interesting Story typical of ILLINOIS HEATING SYSTEMS

WHEN the first section of the Starks Building at Louisville, Ky. was erected in 1911 an ILLINOIS HEATING SYSTEM was installed with approximately 424 radiator traps and drip traps. This system operated for 13 years until 1924 with a repair expense of approximately $62.50 or an average of $4.80 a year.

That's why—

when the second section was built in 1925 there was another call for ILLINOIS equipment—approximately 1047 radiator traps and 47 drip traps or a total of 1094.

A decided preference for ILLINOIS Heating Equipment in the new building was due to the faultless performance, fuel economy, and low maintenance in the old. The approximate radiation is 70,000 to 80,000 square feet in the entire building.

ILLINOIS THERMO TRAPS *have stood the test of time*

It is notable that ILLINOIS Thermo traps installed in 1911, and those installed in 1925, and those manufactured today are identical in *both* design and construction and all parts are interchangeable.

The many exclusive features of* ILLINOIS *Heating Systems are explained in Bulletin 22 (AIA30c2). Write for your copy today.

REPRESENTATIVES IN 40 CITIES OF U.S.A.

ILLINOIS ENGINEERING COMPANY

ROBT. L. GIFFORD President INCORPORATED 1900

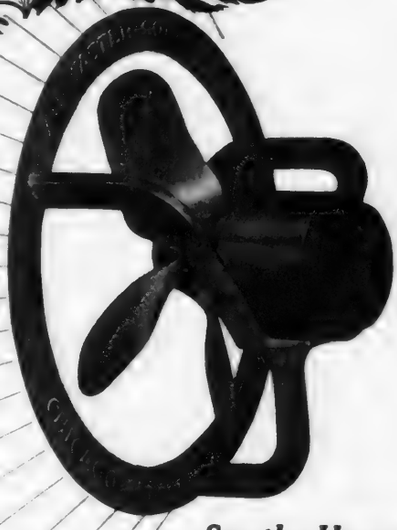
CHICAGO

AIRMASTER

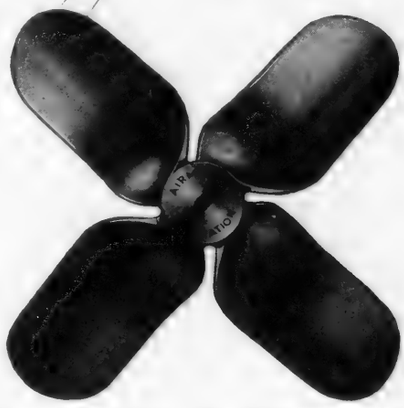
The Custom-Built Ventilator

The Great Achievement in Ventilation ~

The New AIRMASTER Patented Propeller



See the Hump on the Blade



Based on the Eagle's Wing Principle The AIRMASTER Delivers More Air with Less Operating Cost

The AIRMASTER Patented Propeller has introduced a sweeping change into the specifications for all forms of ventilating equipment. Moving a greater volume of air with a smaller proportionate size and therefore requiring less space—materially reducing both installation and maintenance expense—operating with unusual silence—The AIRMASTER is outstanding in the ventilation field.

Working installations and laboratory tests offer convincing proof that the AIRMASTER type of fan is exceptional in all-round efficiency. Investigate the amazing results achieved and the surprising economy of The AIRMASTER before making recommendations to your clients. Write today, without obligation, for complete details.

AIRMASTER Kitchen Ventilator

Housewives have learned that in addition to the disagreeable odors of cooking, the fumes also mar the appearance of walls and household furnishings. The small cost, small size, neatness, but greater power of AIRMASTER Ventilation solves the problem. Easier to install—Fits any Window. Unsurpassed by anything ever before offered. Write for particulars.

Manufacturers Who Use Air Propellers

Whatever the size or purpose of the fan wheel you now use we can supply a suitable AIRMASTER Patented Propeller in either Aluminum, Drawn Brass or Drawn Steel, to meet your specifications, and give maximum results at minimum cost. Models submitted for your own tests.

Write for Details and Sample

Excellent Dealer Proposition

For Home, Office, or Industrial Ventilation purposes The AIRMASTER proves a whirlwind favorite wherever introduced.

Its silent operation alone opens new selling fields for you. Write us today for particulars and our attractive Dealer Proposition.

Manufactured, Guaranteed and Sold by

AIRMASTER CORPORATION

140 S. Dearborn Street **CHICAGO**

1 Degree Differential Horsepower Capacity

(HIGH OR LOW VOLTAGE)

EVEN heat that is truly *even*—with variations of one degree in temperature sufficient to start or stop the burner—can now be secured from all but the largest oil burners. The new line of Con-Tac-Tor Thermoswitches, mercury switch equipped, of which one is illustrated at the right, provides a control device more sensitive than your skin. Loads which are too heavy for direct Thermoswitch control can be handled by a combination of the Thermoswitch and the No. 112 Relay. Thermoswitches are available with or without clock control, in two and three wire types, for high or low voltage.

List Price No. 135 Thermoswitch with single pole high voltage Relay **$27.50**

The No. 112 Relay is built for single and double pole switching, or for low voltage control. The low voltage models contain a transformer in the same housing. Switching is accomplished by Heavy Duty Con-Tac-Tors, magnetically controlled by the Thermoswitch. The advantages of a mercury switch relay—positive contact, simplicity, and long life—need no discussion.

Whatever system of control you use, Con-Tac-Tor developments may be incorporated in it. Fill out the coupon below and attach it to your letterhead for full information.

ABSOLUTE CON-TAC-TOR CORPORATION

ELKHART, INDIANA

USE THIS COUPON

CON-TAC-TOR, Elkhart, Ind. Please send me full information.

Name of Burner handled.....

Type of Control: ☐High Voltage ☐2-Wire Low Voltage ☐3-Wire Low Voltage.

I am a ☐dealer; ☐distributor with.....dealers.

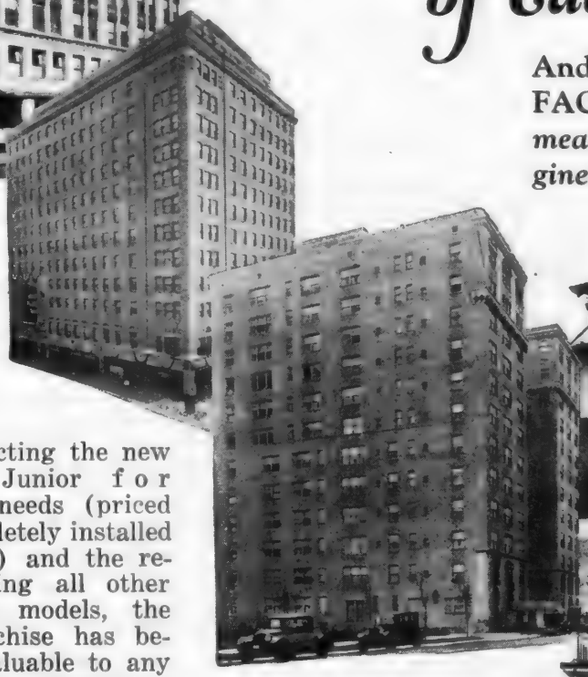
Name.....Address.....

A Hardinge *in the Heating Plant of Each!*

And every one guaranteed by the FACTORY for 10 years—that *means something to heating engineers!*

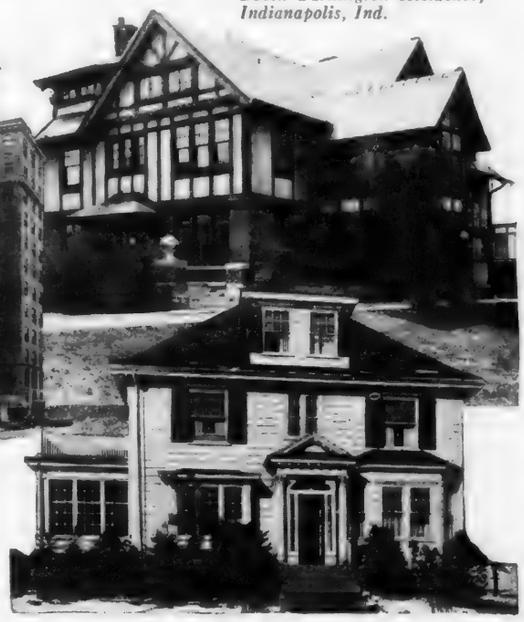
Above—The H. W. Gossard Co., Chicago.

Side—Piccadilly Theatre, Chicago.



Above—Park Shore Hotel, Chicago.

Booth Tarkington Residence, Indianapolis, Ind.



Right—Noyes Residence, Arlington, Mass.

SINCE perfecting the new Hardinge Junior for average home needs (priced **only $385** completely installed—Tanks Extra) and the reductions affecting all other precision-built models, the Hardinge franchise has become doubly valuable to any dealer in every community. It will pay you to investigate and convince yourself that Hardinge now leads the industry from the standpoint of price, to say nothing of its long-recognized economies in operation and upkeep.

Write for facts.

HARDINGE BROTHERS, Inc.

Manufacturers of Precision-Built Machines for 38 years

Factory and General Offices:
4149 RAVENSWOOD AVENUE, CHICAGO, ILL.

Factory Sales Offices:

CHICAGO
Michigan Ave. at Ohio St.

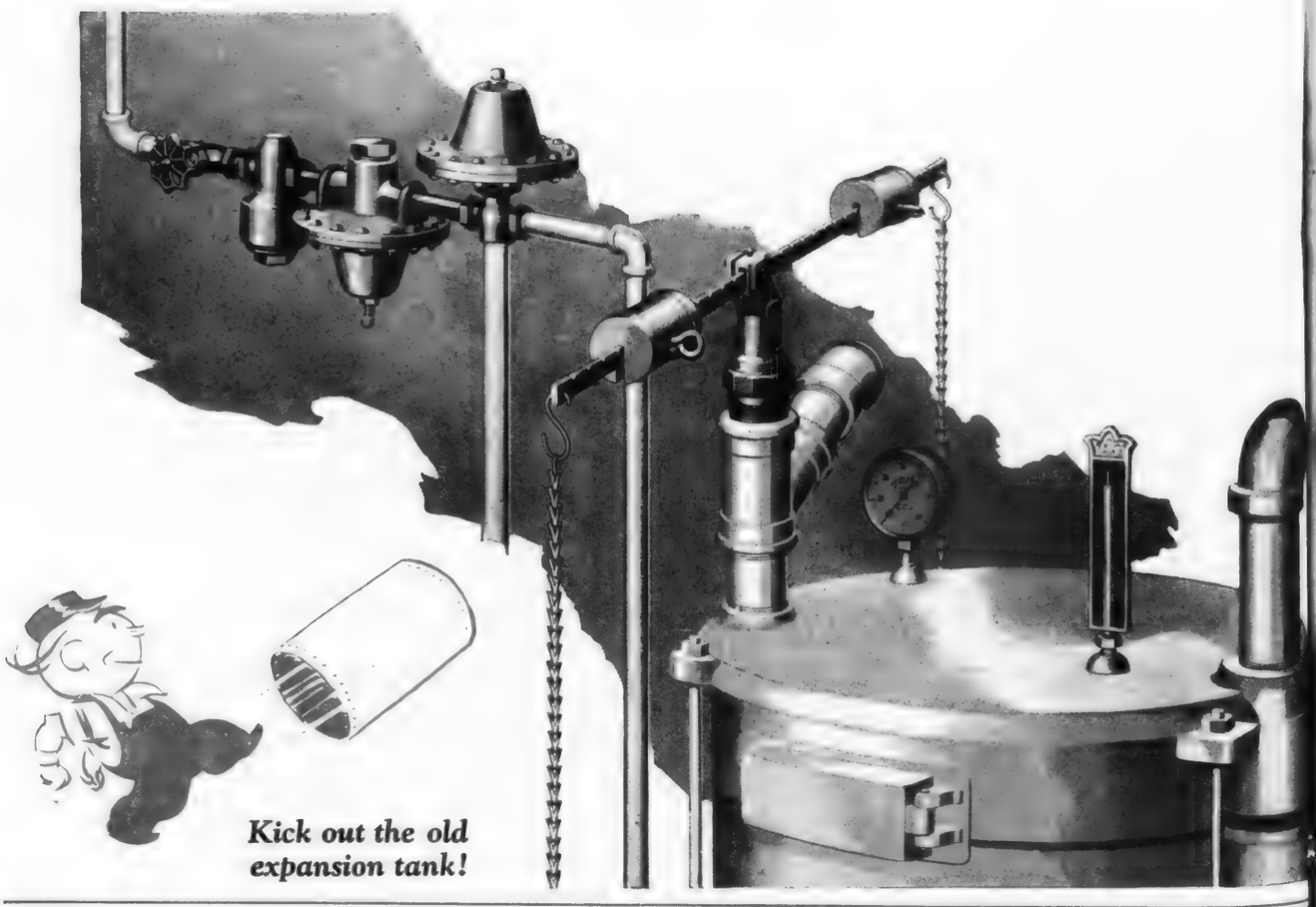
BOSTON
843 Beacon St.

you can safely have confidence in

HARDINGE FUEL OIL HEAT

Make an examination in your territory . . .

Many of them can be brought up to modern standards at small cost by installing Mueller Automatic Hot Water Heat Control Systems



Kick out the old expansion tank!

of the heating plants

There is a rich market for the heating contractor who is prepared to go after replacement business. It doesn't necessarily mean replacing entire heating systems, either. Mueller Automatic Heat Control Systems for hot water heating plants have proved themselves one of the most profitable items a heating contractor can handle, for installation on old plants as well as new.

The heating contractor makes more money on the Mueller Heat Control System and installs it with much less labor and in much less time than an expansion tank was ever put in, on either an old or a new job. And because owners profit by getting better heating systems that give more heat and burn less fuel, the heating contractor gets more work, both old and new.

9 MUELLER Advantages

1. No expansion tank, either open or closed.
2. No more expensive than expansion tank system, and installed much more quickly.
3. Water in system always fresh.
4. Rate of circulation is increased, due to pressure and fresh water.
5. Entirely automatic as to supply, relief and damper regulation. Requires only minimum attention.
6. A very considerable saving in fuel through automatic damper control and more rapid circulation.
7. Perfectly safe. Relief valve and regulating valve are operated positively by pressure of water in system.
8. Valves are positive in action and are the safest type known.
9. Boiling point of water is raised, allowing more efficient heating throughout system.

The Mueller Automatic Heat Control System is one of the greatest advances made in the science of heating since the invention of the hot water plant. It is now possible to kick out the old expansion tank with its troublesome labor costs and danger of leakage.

This patented specialty widens the field for profit both in new and replacement work. Its cost is no greater than that of the old expansion tank. It increases the efficiency and gives *dependable automatic control of the heating plant.*

Complete information and booklet on the Mueller Automatic Heat Control System will be sent promptly upon receipt of your request.

MUELLER CO. (Established 1857) Decatur, Illinois

Branches: New York, Dallas, San Francisco, Los Angeles

Canadian Factory: MUELLER, Limited, Sarnia

MUELLER

Automatic Heat Control System

A Profit-Making Pair

ABC Automatic Oil Burner

YOU can *now* make money selling oil burners

ABC

the de luxe oil burner

Rich or poor, you can get them coming or going. Both the mansion and the cottage are prospects for the dealer who sells these two oil burners. The market is as vast as your ambition.

ABC is the oil burner de luxe. It is the pioneer of the rotary, in-the-ashpit method of burning oil. Now, after seven years, ABC has many imitators. But they are seven years behind! It took seven years and thousands of dollars to perfect this method of burning oil.

Heat King

the burner for every man

Every man can afford the proved Heat King—the burner that is seven years ahead. And the exclusive dealer who sells ABC and Heat King has a burner for *every man.*

Heat King is made by the foremost manufacturers of rotary, in-the-ashpit burners. It is the result of seven years of experience and research. Isn't it reasonable that Heat King should be seven years in advance of the burners that are just now entering the rotary method kindergarten?

Don't ride in the Calliope

When you can lead the oil burner parade. Enlist ABC and Heat King and you can be the drum-major in your city.

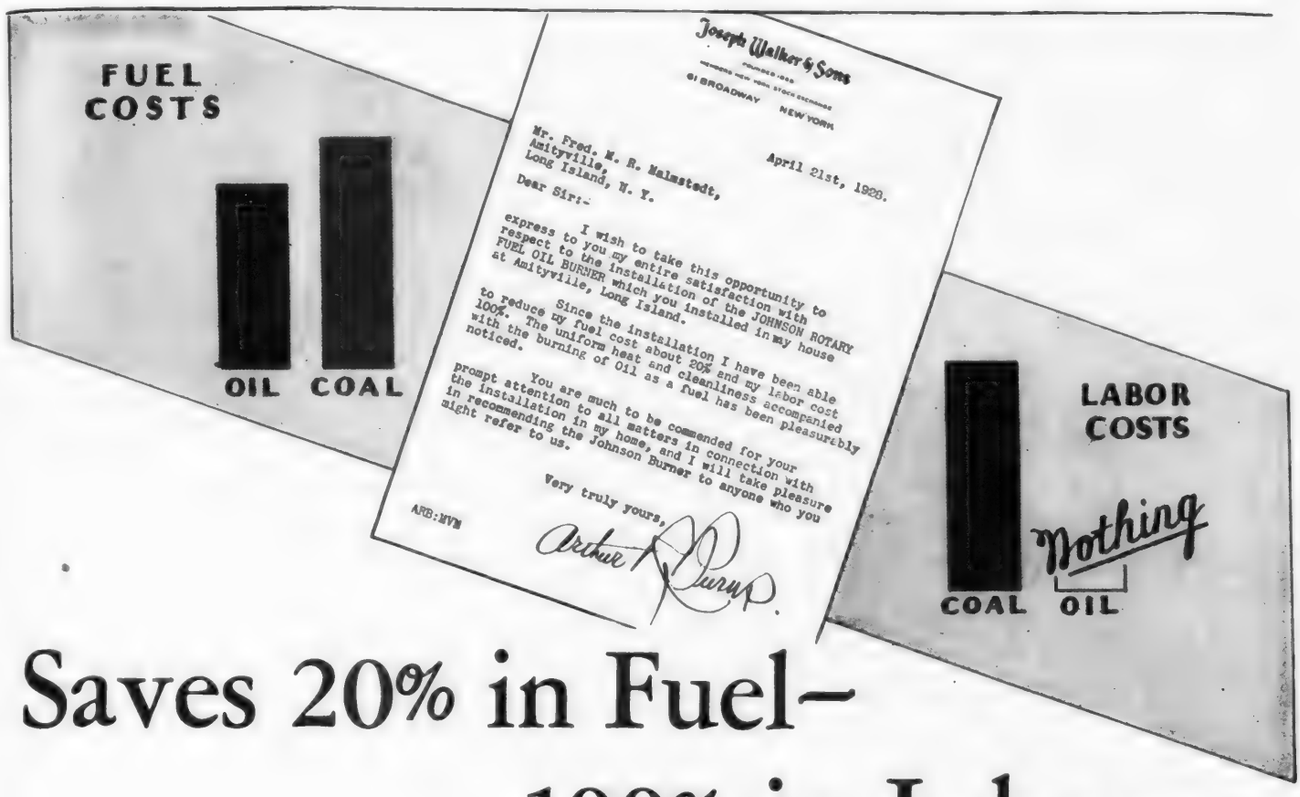
MEMBER OIL HEATING INSTITUTE OIL HEAT AS CONVENIENT AS ELECTRICITY

Investigate now

Detailed information will be sent you gladly. If you are interested in a profitable agency, may we suggest that you get the facts today.

AUTOMATIC BURNER CORPORATION

312 NORTH MAY STREET, CHICAGO


FUEL COSTS
OIL
COAL
Joseph Walker & Sons
61 BROADWAY
NEW YORK
April 21st, 1928.
Mr. Fred. W. R. Malmstedt,
Amityville,
Long Island, N. Y.
Dear Sir:-
I wish to take this opportunity to express to you my entire satisfaction with respect to the installation of the JOHNSON ROTARY FUEL OIL BURNER which you installed in my house at Amityville, Long Island.
Since the installation I have been able to reduce my fuel cost about 20% and my labor cost 100%. The uniform heat and cleanliness accompanied with the burning of Oil as a fuel has been pleasurably noticed.
You are much to be commended for your prompt attention to all matters in connection with the installation in my home, and I will take pleasure in recommending the Johnson Burner to anyone who you might refer to us.
Very truly yours,
ARB:MVH
LABOR COSTS
Nothing
COAL
OIL

Saves 20% in Fuel–

100% in Labor

This saving, *plus* uniform heat and cleanliness, is typical of the dependable carefree performance of Johnson Oil Burners the world over.

Wherever you may go—from California to Maine, and in foreign lands, you will find that home owners, builders and operators of large buildings, factories and industrial plants are praising the economical and dependable performance of Johnson Oil Burners for every heating and power pupose.

You can safely recommend and use Johnson Oil Burners with absolute confidence that they will give enduring satisfaction. The experience of more than 23 successful years as manufacturers of oil burning equipment is behind every Johnson product.

This experience is at your disposal. The accumulated data of oil burning installations under every operating condition is available through our Engineering Service. Let us help you in the solution of your heating or power problems.

MEMBER OIL HEATING INSTITUTE OIL HEAT

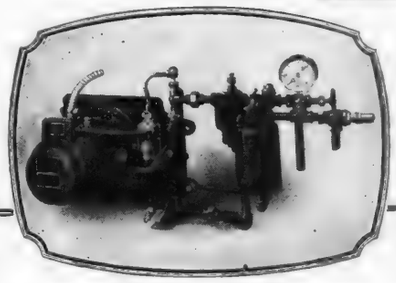
S. T. JOHNSON CO.

Main Office and Factory 949 Arlington Ave., Oakland, Calif.

Factory Branches

SAN FRANCISCO, SACRAMENTO, STOCKTON, PHILADELPHIA

YOU WILL FIND OUR LOCAL REPRESENTATIVE'S ADDRESS IN YOUR TELEPHONE DIRECTORY



JOHNSON OIL BURNERS

Approved

Johnson Rotary Burners are approved by the New York Board of Standards, the Underwriters Laboratory, and by fire prevention bureaus everywhere.

An Opportunity for Men of Vision and Ability

Profits in the oil burner business are limited by the market for the burner you represent. There is a *Johnson* burner for every heating and power purpose: Rotary burners in three styles and six sizes; low pressure air, whirlwind, steam atomizing and natural draft burners, also electric and steam driven oil pumping and preheating equipment.

Every part of town has profit possibilites for the Johnson representative. Mail the coupon for complete information, stating territory desired.

Name _____ *Address* _____

City _____ *State* _____

WARM AIR
Furnace Controls

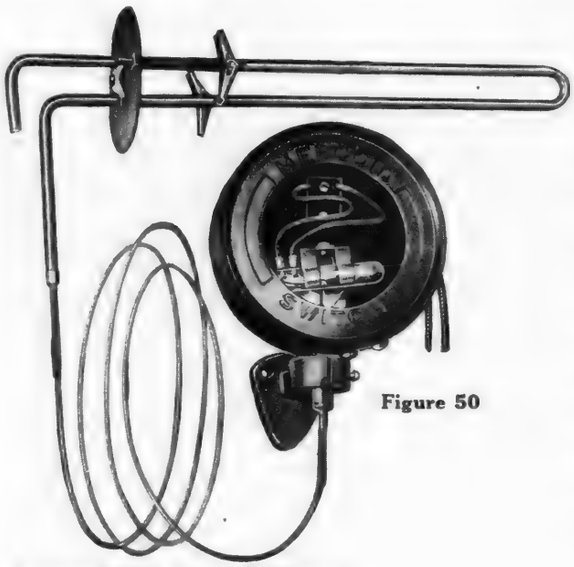


Figure 50

Equipped with Figure 3 Mercoid Tube, for normal working loads not exceeding 10 amperes at 110 volts, or 5 amperes at 220 volts.

Figure 50-L 3-Wire

Designed especially for 3-wire or low voltage installations; with red, white and blue binding posts. Will handle currents not in excess of 1 ampere at 110 volts.

The Mercoid instruments shown here are giving to the heating industry direct automatic control of motor driven units on warm air furnaces; operating as positive safety devices to prevent overheating.

The standard range for dual control on motor-driven units is from 250° F. to 300° F. The range may be adjusted by simply sliding the stem in or out of the furnace hood above the dome, or by standard adjustment on the back of the instrument. Adjustable up to 300° F. to 350° F., or down to 200° F. to 250° F.

The standard range for control of furnace fan on booster installations is from 190° F. to 140° F., cutting in at the high point to start the fan motor, and cutting out when the temperature drops to the low point.

Furnished with bronze stem, charged with an expansive liquid that insures definite "on" and "off" points without deterioration.

Write for complete information concerning these and other Mercoid Controls for automatic heating equipment.

THE MERCOID CORPORATION

564 W. Adams St., Chicago, Ill.

25 Church St., New York, N. Y.

MERCOID
System of
DIRECT CONTROL

YOUR TUBING COST?

If you figure freedom from flaws, accurate sizes, exact lengths, bright finish—as carefully as your first cost—we want to quote on your requirements. Send us specifications.

WOLVERINE TUBE CO.

SEAMLESS COPPER BRASS & ALUMINUM

1415 Central Ave. Detroit, Michigan

Sales Offices: Cleveland; Chicago; Atlanta; Los Angeles; Denver; Rochester, N. Y.; Dayton, Ohio; New York City; Dallas, Texas.

Five acres of modern equipment for making copper, brass and aluminum seamless tubing.

Trane Announces—

HIGHER CAPACITY UNIT HEATERS

Capacity Increases of at Least 50% in All Units
Prices Reduced Considerably by Improved Design

LESS than a year after the first Trane Unit Heaters were placed on the market they had stepped into the front ranks of sales. For buildings of every type, architects, engineers, and heating contractors recognized them as efficient heat distributors. Sturdily constructed — built for years of service under the most strenuous conditions, they appealed instantly to the quality market. Price was never a factor in the sale of these Unit Heaters. Service, performance, and improved features provided the basis for their popularity.

Now — An Improved Heating Unit

Now comes a new development and improvement in the all copper heating unit that increases capacities from 50% upward on all sizes. A slight change in the heating unit — smaller steam carrying tubes and more of them — more advantageously placed is responsible for the increased capacities.

Lowered Prices

Scientific engineering principles coupled with extensive tests in our laboratory and in the field prove this unit to be superior in every way for forced circulation. Due to ease of manufacture the cost per foot of equivalent radiation is considerably reduced — 20% to 40% less depending upon the size of the unit.

In fact, you can now install the Trane Unit Heater with its wide pressure range and other advanced features for approximately the same amount of money as the lowest priced Unit Heater on the market.

STURDY!

We have a test to prove that the new Trane Heating Unit will never be harmed due to uneven expansion. Apparatus has been designed that alternately releases steam and cold water into the heater. To make the test more severe, part of the heater tubes are always filled with cold running water while the balance are filled first with cold water then with steam, at the rate of 1500 times per twenty-four hours. Cold tubes and hot tubes are side by side — a maximum condition of uneven expansion. A day on this tester is harder on the unit than a year of actual service, yet the sturdy Trane Unit operates for months at a stretch without a single sign of change.

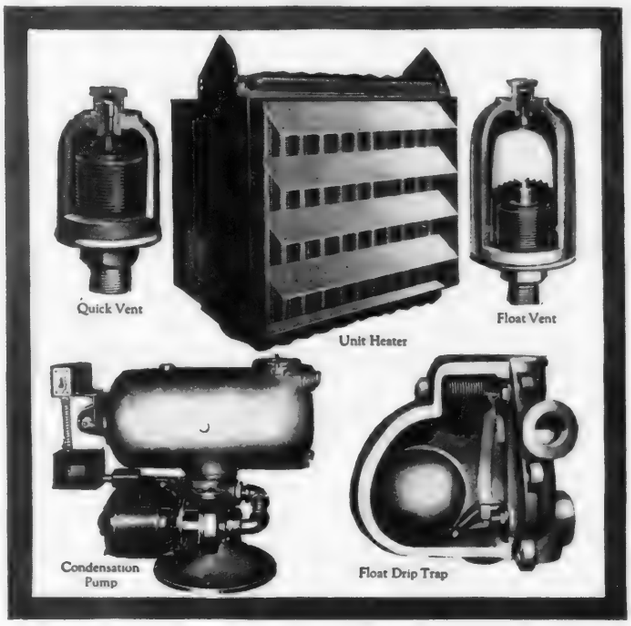
Best Features of Old Heater Retained

All the advanced features that made the former line of Trane Unit Heaters so popular with the trade and owners have been retained — only two piping connections—tilted suspension — heating unit with pressure range from 2 to 150 pounds steam pressure — quietness of operation — low power cost — all of these features are retained in the new line of Trane Unit Heaters.

Can be Installed Anywhere

The quietness of operation of these units together with their neat and compact construction make them ideal heat distributors for use in offices, gymnasiums, laundries, and similar installations as well as on industrial jobs.

This is the third of a series of announcements on new Trane equipment. No. 1 was on the new Trane Under-Window Type Heat Cabinet. No. 2 was on the new improved line of Trane High Efficiency Centrifugal Pumps.



Above are illustrated the various items of Trane Heating Equipment that insure the satisfactory operation of any industrial heating installation.

Unit Heater Construction

SMALLER steam carrying tubes but more of them — more strategically placed to give even distribution over entire face of secondary surface. Steam tubes flared and rolled into cast iron header in typical boiler style — header of heavy cast iron tested to 300 pounds hydrostatic pressure. Entire heating unit guaranteed for any operating pressure up to 150 pounds. These are features that stand out distinctively on the new Heating Unit.

Fans are of special Trane design built especially for Unit Heater service. Motors are of standard manufacture. Variable speed control can be furnished when required.

Casings are so designed that Unit Heater can be installed in connection with fresh air ducts or recirculating boxes when the type of building makes such an installation a requisite.

Angle plates for tilted suspension are furnished as standard equipment. This method of mounting is particularly desirable as the original path of the air is toward the floor rather than merely being deflected downward from a horizontal path by the louvers.

Louvers are furnished as standard equipment on all Trane Unit Heaters. The combination of louvers and tilted suspension insures the most adequate distribution of heat in the working area — Tilted suspension causes the fan to direct the air flow downward — Louvers guide it to the proper location and insure effective breaking up and distribution of the heat currents.

Unit Heating Systems

TRANE UNIT HEATERS take care of just one of the vital points on an industrial heating installation. There are three other points where dependable equipment must be installed if the owner is to get the best results from his heating system.

First — The Unit Heaters must be correctly dripped through dependable traps if they are to deliver their full capacity. Trane Float Traps are especially designed for this service.

Second — Air must be vented from the system quickly and easily if the flow of steam to the heating units is to be uniform and fast. Trane Float and Quick Vents fill this requirement adequately.

Third — On installations where the condensate cannot be returned to the boiler by gravity a condensation pump is a necessity. For this service Trane pumps not only insure satisfactory return of the condensation, but do the work at a lower cost.

For semi-industrial installations or in buildings where it is not desirable to use Unit Heaters throughout the entire installation, Trane Heat Cabinets and Concealed Heaters now replace the ordinary radiator. Here again Trane equipment is used in the way of valves and traps. In fact, you can make a complete installation in any building from a bungalow to a skyscraper and have the complete heating system with the exception of the boiler, pipe, and fittings bear the Trane Trademark. This places "Undivided Responsibility" upon the Trane Company, and assures owner, architect, and contractor that the system will work perfectly in every detail.

The Trane Company - - La Crosse, Wisconsin

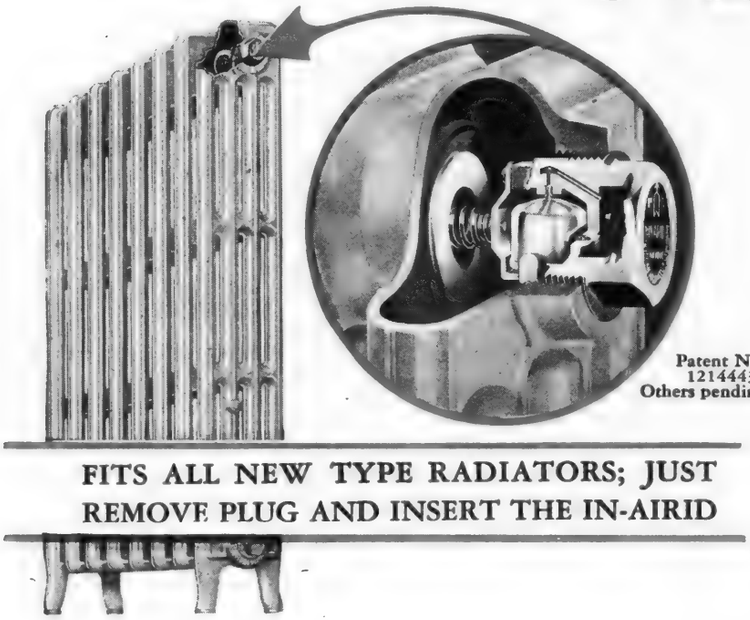
206 Cameron Avenue

Vapor and Vacuum Heating Specialties, Heat Cabinets, Pumps, Unit and Blast Heaters

The American Radiator Company

THE COMPLETE SOLUTION FOR

The NEW



Patent No. 1214443
Others pending

FITS ALL NEW TYPE RADIATORS; JUST REMOVE PLUG AND INSERT THE IN-AIRID

Distinctive Advantages of the IN-AIRID

Prevents short-circuiting—assures complete venting of all the air, makes all sections hot.

Entirely Invisible—thereby improving the appearance of the radiator.

Dry Venting—IN-AIRID is in the driest part of the radiator, yet, should water reach it the float closes instantly.

Cannot "water log"—no siphon necessary, because there is no shell to hold water.

Cannot be damaged because all working parts are within the section.

Easily installed.

Cannot be stolen—or turned upside down, preventing operation.

No hissing—no leaking of steam or water.

Will not clog with dirt because it is in the cleanest part of the radiator—yet when necessary can easily be cleaned if clogged under abnormal conditions.

All metal! Nothing to wear out.

Requires no adjustment and cannot be tampered with.

Inexpensive.

Made and guaranteed by the world's largest manufacturers of heating equipment.

Complete Radiator Venting

WHEN new type radiation is used on one-pipe steam jobs, the steam has a tendency to short-circuit through the top nipples and close the air valve before all the air has been vented. This trapped air greatly reduces the heat output of the radiator, often to such an extent that additional radiation is added. And needlessly, for the real trouble is caused, not by insufficient heating surface, but by trapped air—incomplete venting. (*See diagram on right hand page.*)

Constantly striving to create and perfect equipment that will add to the comfort and efficiency of radiator heating, the American Radiator Company now presents the new IN-AIRID—an automatic air valve that quickly and completely vents all of the air from the entire radiator. And not only is this new valve more effective than any other, but in addition makes possible the highly desirable feature of invisibility. This will appeal to every owner and architect, for the concealment of the air valve greatly enhances the appearance of the radiator.

Construction Features

The IN-AIRID No. 1 prevents short-circuiting and assures complete venting because it is designed with a baffle disc that fits tightly into the nipple connection of the last section. The photograph above shows how this distinctive IN-AIRID feature will force the steam to travel up the last section and drive all the air out ahead before it can come in contact with the valve and close it.

The heavy spring, on which the baffle disc is mounted, allows for any variations in design, threads or casting, and thus insures a positive blocking off of the last section at the top nipple.

AMERICAN
ACCESSORIES DIVISION

Presents to the Trade

A NEW VENTING PROBLEM

IN-AIRID

The Invisible AIR VALVE

The IN-AIRID fits all new type radiators made by the leading manufacturers. Its threaded plug is 1½ inches I. P. S. and made of brass so that it can be made up tightly in the correct position, with the arrow on name-plate pointing straight upwards.

The operation of the IN-AIRID is based on the same principle of a thermostatically charged float, used so successfully in the famous AIRID air valve No. 500. The cutaway view of the valve shows how the air will pass out through the large venting channel until steam reaches the float. Then the volatile liquid within the float expands, bulging out the bottom. This raises the float and closes the port.

The IN-AIRID No. 2 vacuum valve is for "below atmosphere jobs"—permits air to escape but prevents its return into system. It has all the venting features of the No. 1, plus the vacuum seal, with hand lapped monel disc and seat.

Sold and Installed Only by the Trade

The new IN-AIRID requires tools for installation and, therefore, presents to you a profit opportunity on both labor and materials. Order a supply today. Architects, builders and owners will want this new valve, for they will immediately see how it improves the appearance of the radiator. And you can sell IN-AIRIDS in full confidence that they will make a more efficient heating plant.

Be prepared for the busy heating season. Place your order now either with us or your jobber for a trial installation of IN-AIRIDS. If not completely satisfied, either with price or performance, your money will be promptly and cheerfully refunded.

The diagrams above show the relative heating value of two new water type radiators when used on one-pipe steam. One is equipped with the exterior valve, the other with the new IN-AIRID.

THE EXTERIOR AIR VALVE

IN the diagram above the steam pushing the air ahead has naturally taken the lines of least resistance, that is, across the top and bottom openings. But, since steam is lighter than air some steam has a tendency to short-circuit across the top and close the air valve before all the air has been driven from the central part of the radiator. This trapped air and the metal surrounding it will in time become warm because of conduction from the heated portions, and, by merely feeling the radiator it seems to be heated properly all over. However, this trapped air greatly reduces the heating value of the radiator because steam is not in direct contact with all the heating surface.

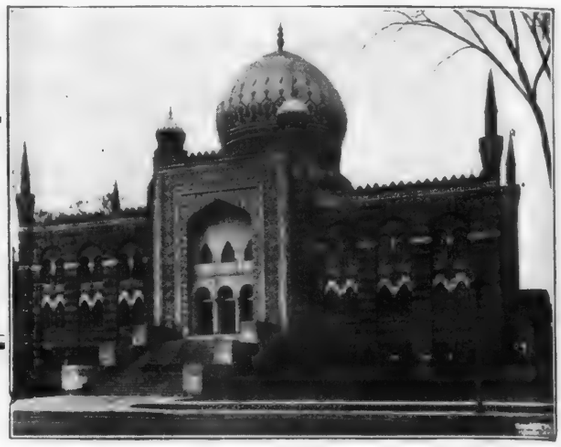
THE NEW IN-AIRID AIR VALVE

IN the diagram above, the steam has the same tendency to short-circuit but the nipple baffle of the IN-AIRID, blocking the last section, prevents the steam from coming in contact with the thermostatic float and closing the air valve. The steam and air must, therefore, travel progressively, venting the sections in turn until *all* the air has been forced up the last section through the bottom opening. Thus, it is evident that the air will be driven out of the center ot the radiator before steam reaches the IN-AIRID and closes it.

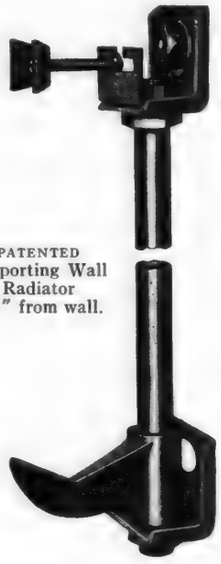
RADIATOR COMPANY

DEPT. AV-79, 40 WEST 40th STREET, NEW YORK

HOTEL LOWRY, St. Paul, Minn.
LAMBERT BASSINDALE, *Architect.*
E. L. RIDLER, *Heating Contractor.*



MOSQUE for TRIPOLI MASONIC TEMPLE, Milwaukee, Wis.
CLAS, SHEPHERD & CLAS, *Architects, Milwaukee.*
WENZEL & HENOCH COMPANY, *Contractors, Milwaukee.*



PATENTED
Supporting Wall Radiator
1¾" from wall.

Universal Radiator Hanger

Convertible on the Job to Meet all Conditions

There is only one Radiator Hanger on the market which will:

Hang a radiator 1¾" or 2½" from the wall—
Is fully adjustable—
Requires only one bolt—
Which has a universal malleable iron hook.

And that is THE MCALEAR UNIVERSAL RADIATOR HANGER. Let us tell you how the McALEAR will cut your labor costs.

Send list of your requirements today for Special Quantity Proposition.

ST. JOSEPH'S SEMINARY, Hinsdale, Ill.
O'MEARA & HILLS, *Architects, St. Louis, Mo.*
JOHN SMALL, *Consulting Engineer, Chicago.*
HANKEE HEATING CO., *Heating Contractors, St. Paul.*

PATENTED

The Up-and-Down Adjustment is Accomplished by Turning this Nut
Supporting Radiator 2½" from wall

PATENTED

Supporting Radiator 2½" from wall, with baseboard.

THE McALEAR MFG. CO.

1901-7 South Western Avenue, Chicago, Ill.

DUNHAM

ARE YOU TRYING TO HEAT ALL OUTDOORS?

THIS illustration may seem absurd but it represents very closely the average heating system waste. Any heating system not equipped to control heat generation and distribution supplies excess heat to the space heated, thereby overheating the building.

This excess heat is transmitted through the building structure and is also lost through windows when opened to reduce room temperature. This is a direct waste which could just as easily be saved as it is now wasted.

Occupants of buildings do not realize the tremendous amount of money wasted through widely opened windows, to get rid of this excess heat while hot radiators are busy releasing more heat into the rooms. The engineer or fireman, although he realizes the waste occurs, has little or no control over it in an ordinary type of vacuum return line heating system.

The Dunham Differential Vacuum Heating System overcomes this evil of wasted heat. In this system steam temperatures within the radiators and piping are varied and are controlled in conformity to outdoor weather. The building is heated on Sub-Atmospheric Steam which is LOW Temperature Steam produced and circulated at pressures lower than atmosphere, and, at temperatures ranging from 133 degrees up to 212 degrees. Even higher temperatures may be used.

Statistics and records of full season's fuel economy, which are attention-compelling, will gladly be furnished upon request.

Look for the Name
DUNHAM
This nameplate identifies a genuine DUNHAM Radiator Trap

U. S. Patent No. 1644114. Additional patents in the United States, Canada and Foreign Countries now pending.

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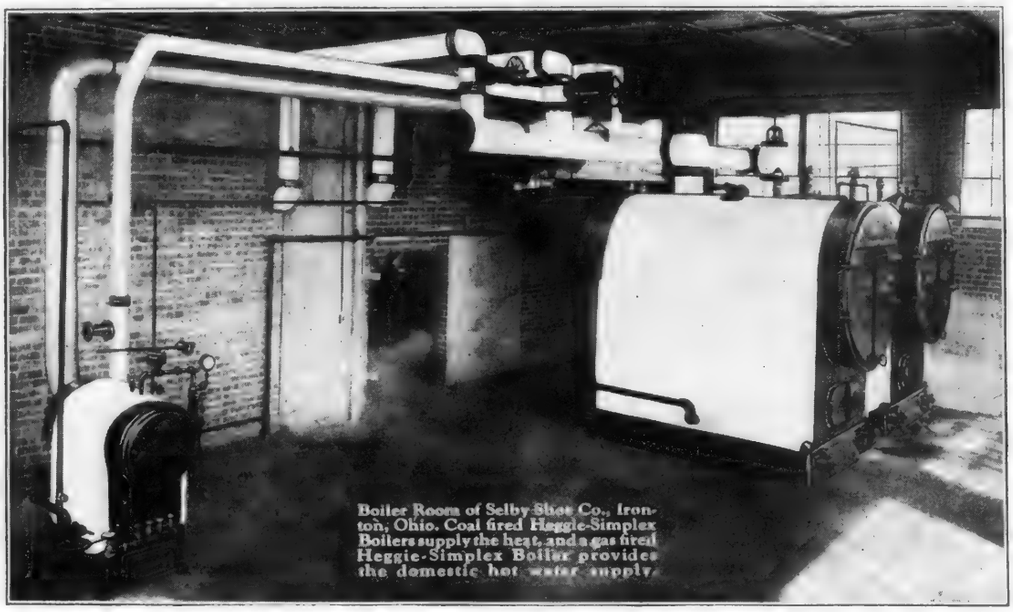

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The Heating & Ventilating Magazine

Volume XXV

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Number 9

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The "Old Home Town"

IT is a good thing at times to get away from one's environment, especially one's business environment. Most of us live so close to our work that if we did not break away from it occasionally we should fail to see it in its true perspective. Business opportunities, for instance, which are so patent to an outsider, do not loom up to men intent on routine.

Since the inauguration of the heating-plant replacement campaign, which is now engaging so much attention on the part of the industry, the vacation period has taken many of us back to the "old home town," with its modern trappings of paved streets, electric signs, traffic cops, "stop" and "go" signs, and all the rest of it. As our steps turn to the residential district, we renew our admiration of the many fine old homes—homes built thirty, forty or fifty years ago, and still preserving every evidence of prosperity and comfort.

Then, being for the moment of a commercial turn of mind, we wonder how many of these homes are modernized with respect to their heating equipment. We visit the shops of the local heating contractors and our doubts are more than realized. Literally scores of homes of the better sort and not a move made to interest the owners in modern heating.

It has well been said that we are at the end of the first generation of steam and water heating. The second generation is here and it is easy to believe that it will offer even greater opportunities in the replacement field than in new construction. The message has gone out to the individual contractors, and while we wait, perhaps a bit impatiently, for their reaction, we have the satisfaction of knowing that it is sure to come.

G. V. Almquist

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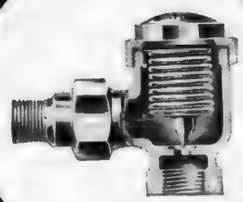

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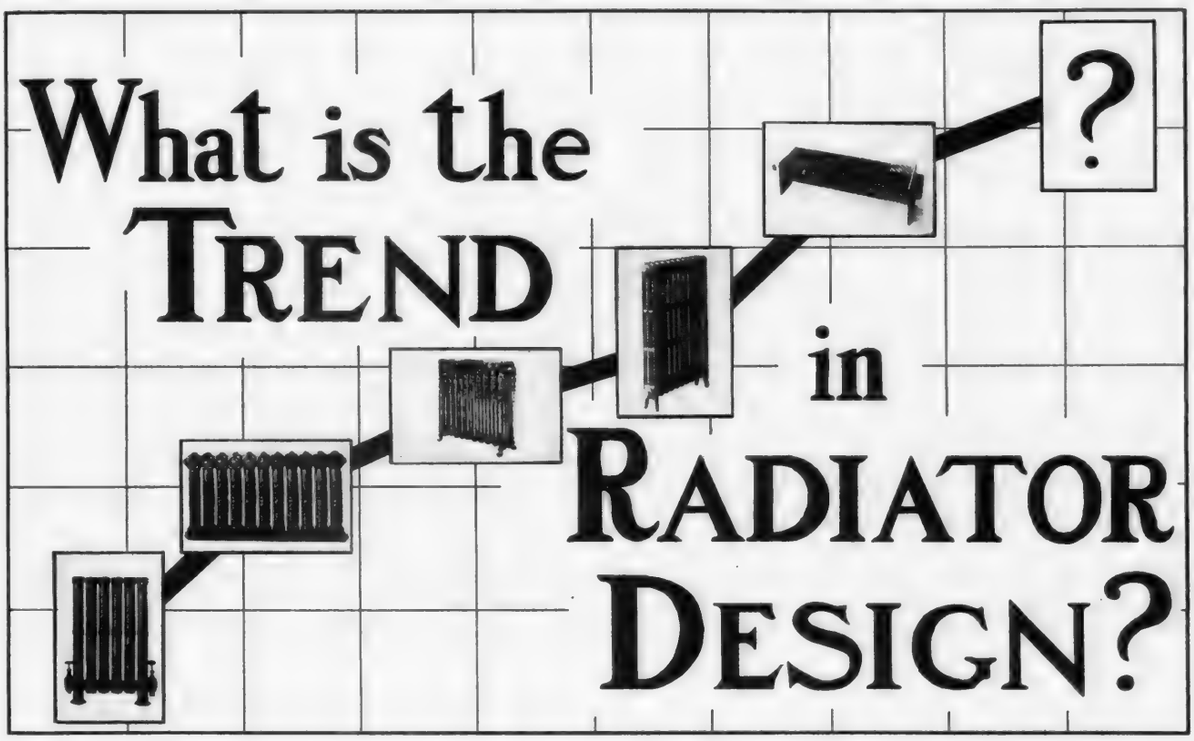
The Heating & Ventilating Magazine

Volume XXV SEPTEMBER — 1928 Number 9



It Is a Long Way from the Early Pipe-Coil and Ornamental Radiator to the Chaste Tubular and Extended-Surface Units of Today. Future Development Should Be Based on New Premises.

By Konrad Meier

RECOGNITION and appreciation of rational factors should underlie the design of radiators, their construction and installation. Following down the path of progress in radiator design, from that embodying pipe sections screwed into headers, in vogue shortly after the Civil War, we have come to a point of divergence.

Today there are advocates of two distinct types—those standing in the open and covered by a metal casing or recessed in the wall behind a grille, and those frankly exposed types, designed to emit a proportionately large amount of radiant energy and to conform as nearly as may be possible to the architectural treatment of the room.

Which path should be followed?

In direct heating, as with any other system, four principal points should be considered; thermal efficiency, hygienic quality, practical needs and aesthetic appearance. It is proper to discuss these points together, since in reality they are inter-

dependent, and the problem of ideal heating cannot be solved at the expense of one or the other of these legitimate requirements.

This is well enough known at least by engineers but, for various reasons, it is not being lived up to in practice as it should be. Present unrest in this field and complaints by the manufacturing interests of not receiving their share of the business, are partly traceable to these failings. Hence, it may be timely to re-state some underlying concepts.

A high rate of heat emission always was considered desirable and advantageous, everything else being equal, but heating surface providing for it generally is more expensive, and apparently on the basis of heat emission, we often can do better with a lower rate. This will only hold true, however, when the heat output is brought to full utilization. As soon as comfort is reduced, incident to cheaper surface, such radiation is no longer likely to pay.

Heat Must Be Distributed Correctly

Our task does not end with the delivery of the heat anywhere within the room. It should be distributed correctly and placed without causing any waste or disagreeable effects. As the writer has pointed out long since,* perfect service is the first consideration and also really the key to economy in the larger sense. Essentially it involves proper application of the heat. Indeed, for the highest over-all efficiency and the best room-heating effect, both radiant and convected heat must be so placed that they will reach the occupied zone at the proper time, but will not be delivered when and where not needed. Thermal efficiency, in any specific case, therefore, will depend largely on the manner of application by the engineer, and this, in turn, should be facilitated by the forms of radiation available. In order to assure the best results, the engineer should have suitable materials. As in other things, the best is generally the most economical in the end.

Swiss Radiator with Valves Especially Designed for Wall Suspension

European Type of Highly Radiant Heating Unit Recessed under Window

Viewpoints of Manufacturer, Engineer and User

Unfortunately, bids are still being judged on the basis of surface or quantity; in consequence, radiation is bought mainly on commercial grounds. And where the cheapest pattern is not suited for the best location, the radiator often is set up elsewhere, while it really should be selected to suit the proper place. The price per square foot, as the dominant factor, also has influenced design and even the method of rating. This has resulted in standards which express the manufacturers' ideals, but the latter naturally are not identical with those of the engineer, who desires to provide the best for the owner. To bring these together should be our aim.

Yet the economic side is not to be ignored and the manufacturing problem is an important factor bearing on it. After all, the reasonable requirements of engineer and owner should be met. Production must conform to these, if service be the first consideration. The results may not, at first, agree with the notions of the layman, or of the salesman, but they will be nearer what the client needs and will make their appeal to those who understand and really should advise the buyer, namely, the professional and the contracting engineer. Radiation, according to engineering standards, should sell on its merits, gradually increasing the demand on the strength of superior service and supporting scientific efforts for sound development of the art. Let us outline these requirements.

Thermal Efficiency

In the average living or working room heated by direct radiation, the greater part of the heat loss takes place through windows and outside walls, where infiltration also makes itself felt. Uniform temperature and comfort are favored by so placing the heating surfaces as to counteract the chilling effect in the most direct manner possible. The

*See "Economy in Heating," Transactions of the A. S. H. & V. E., for 1918.

natural place for the radiator, therefore, is beneath the window, from where it can radiate towards the occupied part of the room and towards the floor.

Heat Transfer Should Be at Low Rate

But in order to function efficiently, the surface should be low and spread out at least for the length of the window, which arrangement assures a high rate of emission. Moreover, the radiant heat then will be fully utilized and, if not too intense, will contribute greatly to comfort. The front of the radiator can be designed to favor this effect, if made distinctly to face the room.

Similar design would not be appropriate, however, for the back side, facing the wall, which only can become effective through convection. But the heat imparted to the air will be useful, when applied to meeting in-draft and down-draft from the windows, for which action the spreading of the surface is likewise desired. At the same time, this manner of application prevents heat from rising towards the ceiling, where it rarely is needed.

For similar reasons, the heat of convection should not be intense, but rather delivered in the form of ample air volumes at moderate temperature, thereby preventing stagnation with disagreeable physiological effects, and excessive heat absorption by the walls.

Therefore, to secure full thermal efficiency for normal situations, radiators should present flat broad surfaces to the front and extended surfaces in the rear. And to make sure of easy and free air circulation, the supports should provide for a proper spacing from the wall. Such a type will have a high rate of heat emission. Owing to its proportions, the rating, moreover, will be nearly constant for different heights and lengths and, in so far as the installation beneath windows is induced, it also will give the best and most nearly uniform room-heating effect—all of which makes it advantageous and dependable in performance.

In the field of blast heating, we have come to the conclusion that the purity, as well as the physical properties of the air supply should be under control. Air cleaning, in one form or another, is used, particularly in connection with return systems, in order to avoid giving the client air of the celebrated "canned" variety. The room air in passing over dusty, heated surfaces always is vitiated, more or less, and even though the direct danger of dust, as a carrier of germs, may have been overestimated, irritation of the mucous membrane caused by it undoubtedly is harmful to many persons and disagreeable to the rest. Failure to provide clean surfaces, next to overheating, accounts for the inveterate desire to open windows in heated rooms and probably explains, to a large degree, the campaign for window ventilation.

In any event, since air cleaners are not applicable to radiator heating, we should eliminate dust and dirt in connection with that system, if only as a matter of cleanliness, which always helps to preserve the sweetness of the air. For that reason ready access to concealed radiation should be provided, for concealed surfaces are likely to gather dust. The air circulation takes place at higher temperatures, lower relative humidity and with increased dust contents.

That it is possible to attain a high degree of comfort and sweet air with direct heating is borne out by the old-fashioned tile stove, with the prevalent radiant effect and clean, moderately hot surfaces. In spite of inherent inconveniences, these heaters still are preferred by many people for that reason. For hygienic quality, the best thing is to adopt their good features, which is not at all impracticable.

By means of mild water heating we can fully utilize the radiant heat, which does not impair the purity of the air. In so far as we depend less on air heating, comfort actually is secured at lower room temperature, full comfort being generally attained at about 66° F.

By proper disposition, favoring the lower strata of the room, we can go still further in that direction, so that extremes in relative humidity are effectively prevented. This fact is amply borne out by experience. Indeed, complaints of dryness and dust generally are caused by hygienic faults in heating.

Utilization of radiant heat involves freely-exposed surfaces. These are easily kept clean, and the irritation from dust thereby is materially reduced. Spreading of surfaces also is favorable to cleanliness, and the provision for ample air circulation gives easy access to the rear portions of the radiator.

To spread the surface for about the length of ordinary windows requires a type of radiation between the typical column or tubular and the wall radiation. It is not easy to understand why the distinct gap in the designs available has not been filled, inasmuch as single-column radiation is expensive, and wall surfaces are not adaptable enough for the majority of cases.

Such an intermediate, when built as a wall radiator and especially designed for application under

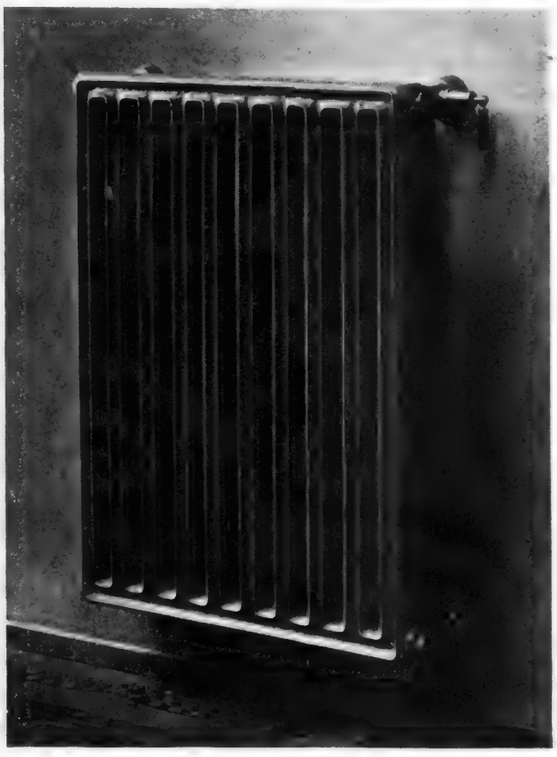
Modern American Radiator Designed for High Percentage of Radiant Heat Emission

windows, will not protrude much and is not likely to interfere with furniture. One depth with two or three heights will suffice for normal cases and could find ready application in other situations. Standardization and rating would be greatly facilitated. To builders it would be very desirable to have the radiators entirely clear of the flooring, and, to architects, to have the piping invisible, which readily can be accomplished with such a type.

It also seems possible—and should be welcome to contractors—to eliminate or to minimize certain difficulties of installation and to reach a degree of neatness similar to that prevalent in modern plumbing. Practical and rapid installation does not preclude neatness and finish, but we must apply ourselves to the problem. The material should lend itself to this end. Design for efficient heating and hygienic quality may as well be combined with such practical features.

Really attractive radiation for general practice would be a great asset and is desired by all concerned, not merely for commercial reasons but, judging by the persistent attempts to conceal direct heating in rooms of any pretension, we must conclude that material or practice somehow is still at fault in this respect. Evidently, it is not enough to bring out neater patterns and better castings, as has been done during recent seasons.

One of the first principles in aesthetics, the writer is told, lies in presenting a true and harmonious expression of the purposes as a thoroughly finished piece of work. This is not accomplished by architectural treatment, which simply conceals the apparatus and evades the problem. A radiator is at least self evident, particularly when built for radiant effect, as its name implies. It is, therefore, only logical to design heating surface with a distinct front side, which also provides the opportunity for treating each radiator as an individual unit, while retaining the usual method of assembly and the adaptability to space. This is necessary for finished appearance. But to that end we must go further and bring into harmony the connections and supports, which readily can be done with a wall radiator.



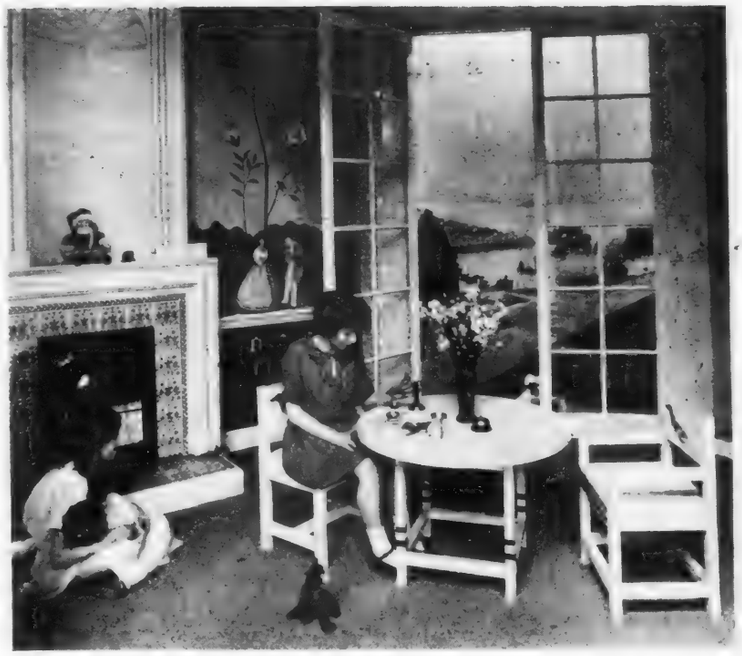
"Columbus" Type Radiator, Long a Favorite in Continental Heating Practice

When built for service, exposed radiation will generally give highest efficiency and be most responsive in action. It will be clean and practical. Finished appearance is the result of careful rational design. Concealment adds nothing to these essential qualities, but rather detracts from them while increasing the cost. Hence it should be good policy to obviate all excuse for it, wherever direct heating is indicated. Improvement of general practice along these lines should increase the demand for radiator heating on its merits. Being most economical in the use of heat, with proper application, it is the best medium for warming by any fuel or by central station service. Development of the apparatus itself to highest perfection is in accord with the new spirit in the art of building, which makes for truth and simplicity. It is good engineering, the solid foundation for business.

Novel Designs of Wall Radiators

The type of radiation introduced some years ago by the Iron Works Clus, in Switzerland, is shown below and on Page 54. It was designed wholly with a view to best service and to attain neat installation without further aid. Two patterns are presented for choice. One essentially is a slab section, which form is appropriate for radiant effect and, with suitable combinations, gives sufficient adaptability. The other pattern follows more traditional lines and is cast in sections of several columns combined to suit. Both permit practically invisible connections from the rear and have self-contained supports for attachment to the wall, which are especially handy for the numerous installations now under way in existing buildings, but equally welcome for new work. The back side of these radiators is designed for air heating, but with purely vertical and easily accessible surfaces.

As a result of this attempt, there is a considerable saving of space compared with other cast-iron radiation, while the heat emission is at least equal to that of single-column patterns. Weight and water contents are brought down to the same figures as claimed for tubular radiation, the design being somewhat similar, but with the sections turned sideways. With a small number of patterns it is possible to meet ordinary space conditions under windows, and full utilization of heat for comfort is assured thereby. The cost is about equal to that of other cast-iron radiation of like proportions. Hence, by meeting the engineering standard of superior service, we can obtain radiation of high efficiency, which is at the same time clean, practical and satisfying in appearance.



Gas-Fired Radiant Heaters Have a Wide Application in the Home

Gas Heating *for the* Heating Contractor

Part IV—Conditions in Eastern States Generally Favor Extending Use of Gas Fuel

By G. C. Carnahan

WEST Virginia is entirely supplied with natural gas. The available gas in this state always has been tremendous and prices exceedingly low. Gas is the leading fuel for residential heating and even in heating larger buildings in spite of the large production of coal within the state. Gas-fired central heating plants are not used as extensively as in other parts of this eastern natural-gas territory. A majority of the central plants used originally were designed for coal. The extremely low price of gas has led to the use of many inefficient appliances in this territory.

The natural-gas area includes the extreme western portion of Maryland where conditions are similar to those in West Virginia. The greater part of Maryland, however, is supplied with manufactured gas. Heating in Baltimore is well developed. This was among the first of the manufactured-gas cities to actively promote gas heating. Fifteen-hundred gas-fired central heating plants are in use in this city, most of which have been installed for several years. Active selling of the central heating plants was discontinued when it was found that the winter send-out of gas was approaching the manufacturing and distributing capacity of the present equipment. Within the last year sales activities have been renewed. Outside of Baltimore little gas heating is done in the state. Washington boasts of several hundred central gas-fired heating systems. Practically no gas heating is done in Delaware.

Pennsylvania is supplied, in the western portion with natural gas. Pittsburgh is the largest city and thousands of gas-fired installations are in use. Warm air is quite popular—steam and hot water being used for the larger homes. The natural gas supply in Pittsburgh has been increased so that at present there is plenty of gas at all seasons of the year. Central heating plants are much more popular here than in other natural-gas territories, and a large percentage of the installations originally were designed for coal. Pittsburgh is fairly representative of the natural-gas portions of Pennsylvania, except that perhaps more of the smaller appliances, such as gas stoves and unit heaters, are used in the smaller cities. In the manufactured-gas region, Philadelphia is the leading city in heating sales. Gas heating has progressed to a marked

These Brick Were Burned in Gas-Fired Kiln Using as Much Gas as Ten Average House-Heating Boilers

degree in spite of a combination of circumstances that have not been conducive to the development of this business. The local gas company operates a city-owned gas plant on a cost-plus basis and makes practically no attempt to sell gas.

In the Metropolitan Area

New York State is supplied with natural gas only in the extreme western portion. Buffalo, which is the chief center of the natural-gas portion, has experienced a shortage in supply during severe winter weather. It has gone through a period not unlike the present condition in Cleveland, but this has been remedied by the addition of manufactured gas during the winter season. Conditions were so bad that complete heating with natural gas was practically at a standstill until an adequate supply was assured by the addition of manufactured gas. During the last two years sales again have started to increase and gas is resuming its position as a competitive heating fuel.

The rest of the state is supplied with manufactured gas and, aside from the Metropolitan area of New York City, New York State presents one of the most likely fields for heating with manufactured gas. Several hundred gas plants have been built in various parts of the state within the last two years and, as anthracite coal is used, gas heating represents little increase in actual fuel cost.

Metropolitan New York, as well as the portion of New Jersey bordering it, never will develop the amount of residential gas heating in proportion to its population that obtains in the rest of the state, because of the small proportion of residences to apartments. Commercial heating is the big outlet for gas in Metropolitan New York. Gasteam radiators, amounting to three quarters of a million square feet of radiation, are sold annually in this area. In the rest of the State of New Jersey, all of which is supplied with manufactured gas, heating is developing rapidly. Summer resorts, like Atlantic City, have an ideal outlet for heating gas because the large hotel business boosts summer sales above the winter output, and heating is being pushed to fill in the winter valley.

Massachusetts, Connecticut and Rhode Island, all of which are supplied with manufactured gas, have taken to gas heating in a most promising manner within the last two years. The fact that anthracite coal is very commonly used allows gas to compete on favorable terms. This area contains many wealthy communities in which the added cost of heating with gas presents small resistance.

The comparatively large number of strikes in the anthracite coal field in recent years has done much to increase the popularity of coke in the southern New England States. This, at the same time, has allowed the gas companies who are selling coke oven gas to find a profitable market for the coke and to market the by-product, gas, at lower than and to market the by-product, gas, at low rates. The same situation applies in New York State.

Commercial heating also is developing rapidly. In fact, all of the territory adjacent to New York presents one of the best markets for heating with manufactured gas. Maine, Vermont and New Hampshire, while in some respects resembling the other New England States as far as potential market is concerned, do not contain the possibilities of the three other states in this group. Gas heating is progressing more slowly and is confined more to the southern portion of this territory.

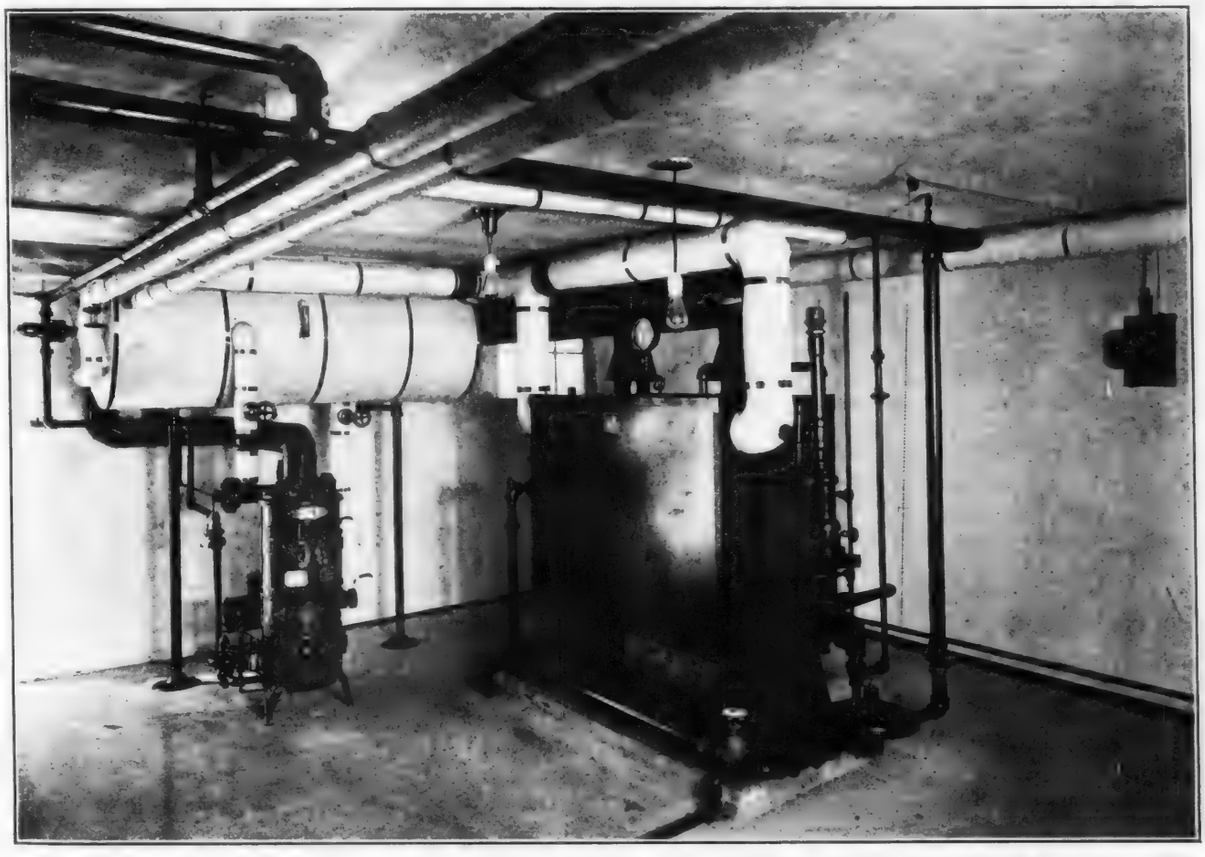
Summary

In reviewing the national situation in regard to the development of gas for heating, several factors stand out prominently. More natural gas than ever is being produced, and the discovery of new supplies makes it certain that natural gas will increasingly be used for heating purposes. More intelligent legislation and a more tolerant attitude on the part of the public, in regard to adequate rates necessary for producing companies to render satisfactory service and extend their pipe lines to other communities, will increase the number of customers, and the assurance of satisfactory service will encourage many more to depend entirely on natural gas for heating. Higher rates will discourage the widespread waste of natural gas caused by its use in poorly-designed equipment and will increase the market for efficient appliances designed primarily for gas. This, in turn, will make the present supply do more useful work and will result in a large growth of heating without increasing the amount of gas used.

Processing of low-grade coal and development of the domestic coke market may have an important bearing on the future of the gas-heating rates. Producers of coal gas will be able to dispose of two fuels—coke and gas—and it is equally essential that both markets be developed, because if both fuels can be sold at a profit, and with large production, the ultimate price of each can be lower.

The development of mixed manufactured and natural gas supplies will lengthen the usefulness of natural-gas production in regions where the supply is not adequate to meet the uneven demand occasioned by the heating load. In both the natural and manufactured operations there is a marked movement toward the consolidation of small properties into large holding companies with enough capital, under strong management, to develop the various markets for gas among which gas heating is a promising outlet. Many small companies have lacked the capital and borrowing power necessary to make the initial investment in equipment in order to develop their markets.

Executives of manufactured-gas companies have generally reached the conclusion that a considerable amount of heating business can be added to their sales without seriously disturbing their present send-out ratios. They are making the necessary price concessions and developing sales organizations to secure this business. The steady increase in the use of manufactured gas for industrial processes — some of which is strictly summer-time business and all of which increases the basic send-out—provides for an increasing amount of heating business as a desirable class of gas sales. In the manufactured-gas areas, the use, for heating purposes, is developing most rapidly in and around metropolitan areas. During 1927, gas was sold through 14,731,000 meters and, with this vast and widely extended service established, gas surely will continue to grow as a competitive heating fuel.



Gas-Fired Heating Boiler and Water Heater Present the Last Word in Modern Household Equipment

DOMESTIC STOKERS—

Their Evolution and Design

Automatic Firing of Solid Fuels in Home Heating Plant Follows Early Industrial Practice. Present Domestic Stokers Embrace Plunger, Chain Grate and Worm-Feed Types.

By William D. Edwards

WHEN the question of the economical production of power began to receive serious consideration, the first efforts were along the line of savings in the use of steam and led to the development of improved steam prime movers and auxiliary equipment. However, the old methods of hand firing still remained, until a realization of the economies possible in the generation of steam resulted in the development and use of mechanical means of firing.

In the heating and ventilating field, history seems to be repeating itself; the devices and systems offered by manufacturers to effect economical heating are many, but until very recently the janitor and the coal scoop still held full sway.

The advent of oil and gas burning have stimulated the installation of equipment for automatic firing devices, this applying to both kinds of coal as well as to fuel oil and gas. The full convenience of fluid fuels can only be realized in part by the use of coal, as the supplying of coal to the hopper and the removal of ash still will require manual attention. Nevertheless, the advantages of automatic feed of coal to the furnace as required, and freedom from smoke nuisance readily can be secured by the use of coal in a properly designed stoker.

Domestic stokers have been developed from the experiences with stokers in the power field, and an outline of power-stoker development will be of interest and value.

A general classification of these stokers divides them into three types: the underfeed stoker, as shown in Fig. 1; the chain grate, Fig. 3; and the inclined grate type shown in Fig. 7. Each has its special advantages, depending on the type of service

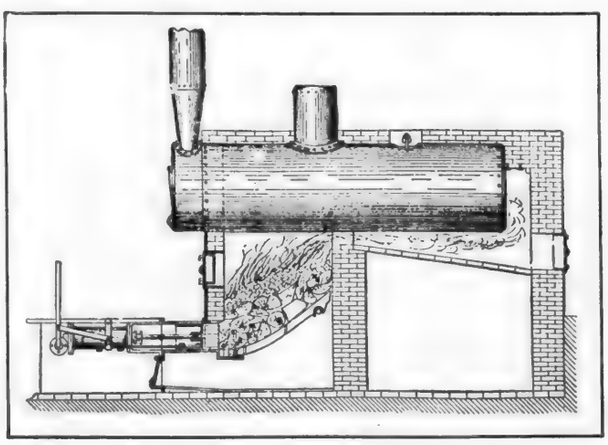


Fig. 1. Earliest Type of Jones Underfeed Stoker as Built in 1888

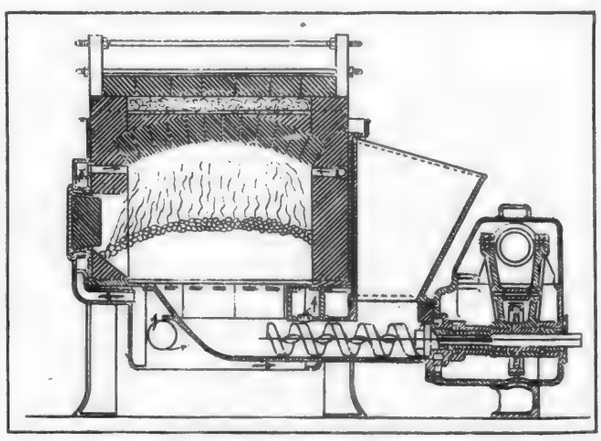


Fig. 2. Screw-Feed Stoker Developed About 1890

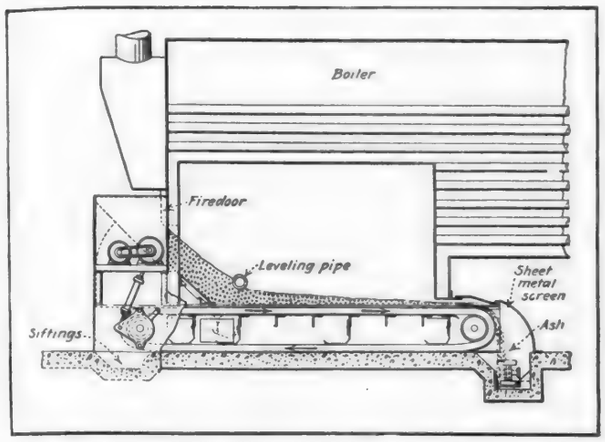


Fig. 3. Chain-Grate Domestic Stoker Adapted from Power Field

Fig. 4. Front End of Boiler Equipped with Chain-Grate Stoker as Shown in Fig. 3

to be performed as well as the class of coal to be handled.

The ancestor of the various underfeed power stokers now on the market, is the old Jones underfeed; it is of historical interest that this stoker was developed in a wood-burning section, Portland, Ore., and first was used to fire slab-wood under a power boiler, as shown in Fig. 1. At the time of the World's Fair in Chicago, this stoker was brought to that city, its original design much changed, and was installed for coal-burning service. It was a novelty and the pioneer period, one of many tribulations, was finally crowned with success, both mechanical and commercial.

Following the advent of the Jones, another stoker appeared on the market, then known as the American, and is shown in Fig. 2. These stokers are much alike except that the latter used a screw feed instead of plunger feed, this being due to the fact that the plunger method was covered in the Jones' patent.

These stokers were built for capacities ranging from 180 to 200 boiler horse power per retort; to meet the requirements of larger boilers a number of stokers were installed side by side in one furnace.

The next step in the evolution was the modification of the Jones retort-type, the present-day stoker so universally used in the large power plants with many retorts.

As the Jones stoker was the foundation upon which many of the large power stokers of the present day are based, so is it the basis upon which a number of the smaller sizes of stokers are designed; they either are a direct offspring of the Jones or are descendants of Jones' eldest child—the American.

Again born in Oregon, the stoker shown in Fig. 5 shows all of its heritage from the stoker of Fig. 2. It is built for heating boilers, and is now on the market designed with capacities ranging from 1000 to 20,000 sq. ft. of steam radiation, with hopper capacities from 350 to 900 lbs. of coal. Well adapted to the burning of bituminous coals, either bituminous or lignite screenings can be burned. The cast tuyeres are the only parts exposed to the heat, and these are cooled by an air blast from the same fan which supplies the mechanical draft. Air is forced into the closed ash-pit and from there is fed to the fire through the slotted cast-iron blocks, or tuyeres, on top of the retort. Since one motor drives both the fan and coal feed, the relative proportion of coal and air is kept constant regardless of its speed, which is adjustable. Domestic stokers of this type usually are equipped with thermostatic control, both from the room and from the boiler.

Another stoker of the same family is shown in Fig. 11 and Fig. 12. This unit is designed to burn the small sizes of anthracite coal—buckwheat and

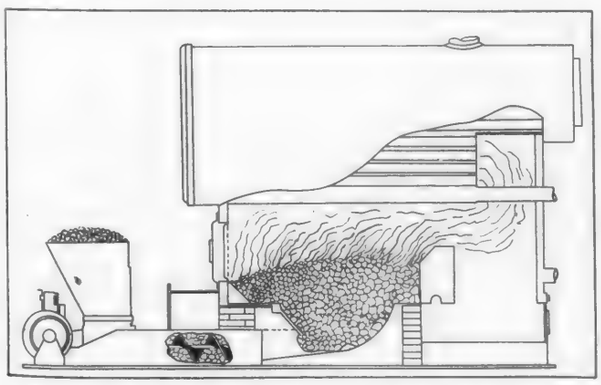


Fig. 5. Modern Stoker for Heating Plants, Evolved from That Shown in Fig. 2

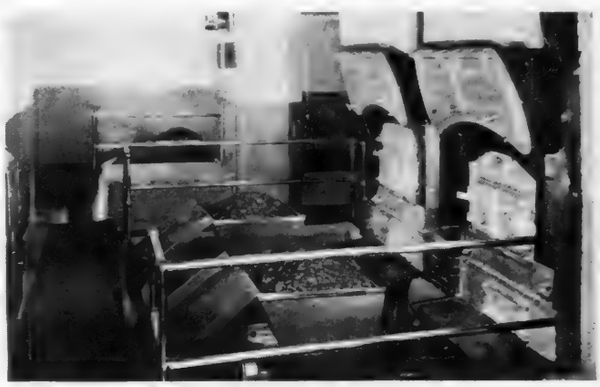


Fig. 6. Duplex Installation of Stokers Shown in Fig. 5

rice. Coal falls, by gravity, from the hopper onto the screw, which is driven by a 1/8 or 1/6 H.P. electric motor. The screw carries the fuel into the firepot, which is used in place of the customary grates. As coal is burned, the ashes are guided by flanges onto the ash worm which conveys them out of the furnace to a dust-proof can. An adjustable clutch controls the amount of coal fed. Stokers of this make are available in sizes with capacities from 600 to 1000 sq. ft. of steam radiation; it is manufactured in three sizes, the smallest of which also can be used in warm-air furnaces with capacities under 1000 sq. in. of leader pipe. Depending on the size of stoker, the hopper holds either 300 or 500 lbs. which, in a domestic installation, would last for some time. This stoker also can be purchased for domestic water heating installations.

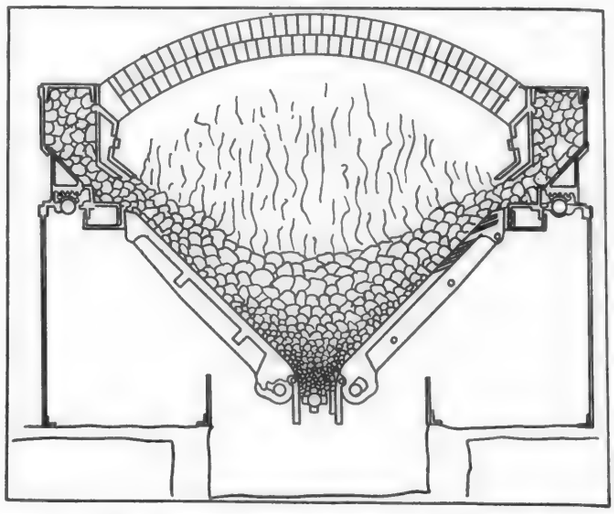


Fig. 7. Inclined-Grate Stoker as Used in the Power Field

Water-Pressure Used to Operate Plunger

The stoker shown in Figs. 8 and 9 descends directly from the Jones, as it has the plunger feed. It is automatically operated by water pressure, which can be so regulated that the proper amount of coal will be fed from the hopper into the retort. Here it is gradually pushed upwards into the hot coals on the grate. This stoker is equipped with thermostatic control.

Inclined-grate stokers such as that shown in Fig. 7 have a descendant in the small boiler stoker of Fig. 10. This stoker is available for boilers of medium rather than small size, and can be either hand or power operated.

When operated by power, a hopper is placed in front of the boiler, the fuel being pushed into the firebox by a piston driven through a cam shaft by an electric motor. In accordance with the best practice in burning bituminous coal, for which this stoker particularly is adapted, a refractory arch divides the combustion chamber into two parts, the upper, front one, being for the distillation of the green coal, and the rear, lower part, for the burning of the coke. The lever which operates the movement of the grates, causing the coal gradually to move down the incline, can be worked by hand, if desired. In the firebrick arch there are passages through which the volatile gases are driven off and consumed. Any clinkers which gather on the lower portion of the grate, called the ash dump, and by means of the lever, are discharged into the ash-pit.

For heating duty in connection with the buildings of large size, such as office buildings or apartment houses, with boilers ranging from 100 H.P. up, power stokers can readily be adapted, as they now are built with electric-motor driven plungers replacing the steam-actuated plungers, thus permitting their operation under low-pressure steam or water plants.

For boilers above 50 H.P., either high or low pressure, a stoker adapted especially for heating plants recently has been placed on the market. This shown in Fig. 3 and Fig. 4 is a modification of the chain-grate stoker which has been popular in the power field. Either anthracite or bituminous coal can be burned with this stoker, which, differing from the usual chain-grate stoker, has no ignition

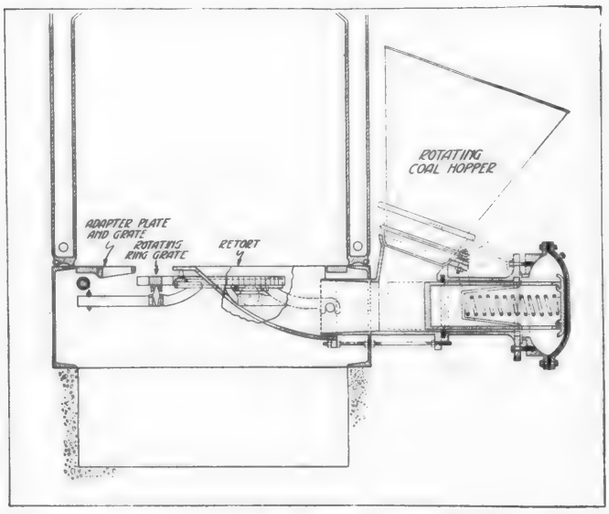


Fig. 8. Water-Operated Stoker for House-Heating Plants; a Descendant from the Jones

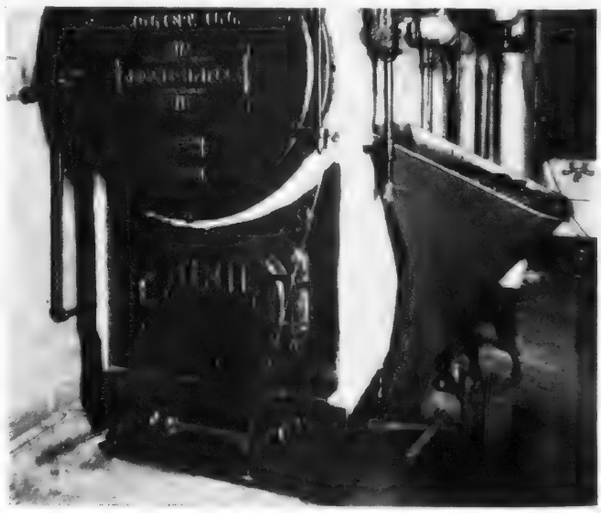


Fig. 9. Below the Hopper Is the Diaphragm Operating the Plunger as Indicated in Fig. 8

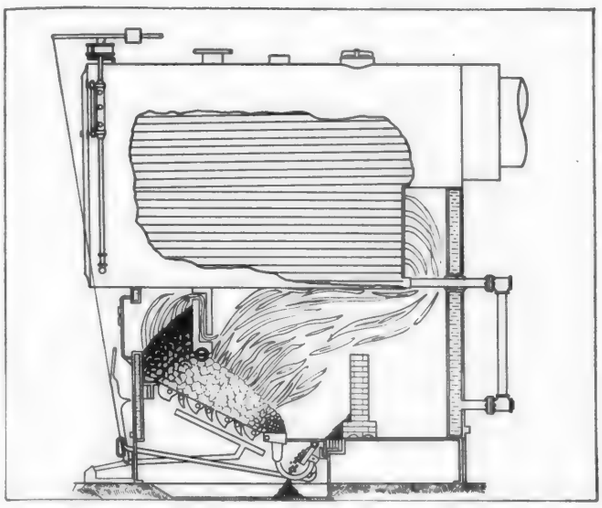


Fig. 10. Inclined-Grate Domestic Stoker Can Be Operated by Hand or Power

arch. It is this construction, making the arch unnecessary, that permits it to be used in heating boilers, where the headroom usually is low. A magazine hopper is provided, from which coal is delivered to an over-feed grate section. Coal thus is introduced on top of the burning fuel, so that it ignites from the bottom. After ignition the chain grate removes the fuel from this section, carrying it under the leveling pipe, which strikes off the fuel bed and determines its thickness. This leveling pipe is made of a special chrome-steel alloy, and is either air or water cooled as desired. By the time the coal reaches the end of its travel it is burned out, having been gradually consumed. Ash is deposited in a shallow ash-pit from which a conveyor deposits it in a can in the ash-storage bin. Air pressure in the windbox under the stoker, for the forced draft, varies from a maximum in the first or ignition zone in the front to lower pressure in each succeeding zone. Dampers are provided so that the amount of air in each zone can be separately adjusted to meet the requirements of that zone. Not only the small sizes of bituminous and anthracite coals can be burned but coke breeze can successfully be consumed.

Practically all of the small stokers, as well as the larger sizes, are automatic in operation, both coal and air supply being controlled by the steam pressure, or temperature of the water in the case of a water heating-system.

It will be noted that the greater number of the small stokers are designed on the underfeed system and retain the closed retort and forced-draft air supply through the tuyere openings at the upper part of the retort; however, the method of coal feed to the furnace seems to be mainly divided into two schools, the ram plunger feed and the screw or worm feed, with the chain-grate stoker rapidly gaining favor.

Early Difficulties Have Been Overcome

When the Jones underfeed with the plunger and the American underfeed with the screw were strong competitors, it was noted that the action of the plunger feed frequently resulted in a general breaking up and readjusting of the fuel bed which was very beneficial. The steady feed of the screw type often failed to secure this result and, in addition, there sometimes was a tendency of the fuel to feed up at one side of the retort, giving an uneven fire.

In power-plant service the coal and air supply are fairly continuous, varying in intensity in accordance with the load. With the small stoker in the domestic heating field a different operating condition exists, due primarily to the difficulty of main-

(*Continued on Page* 70)

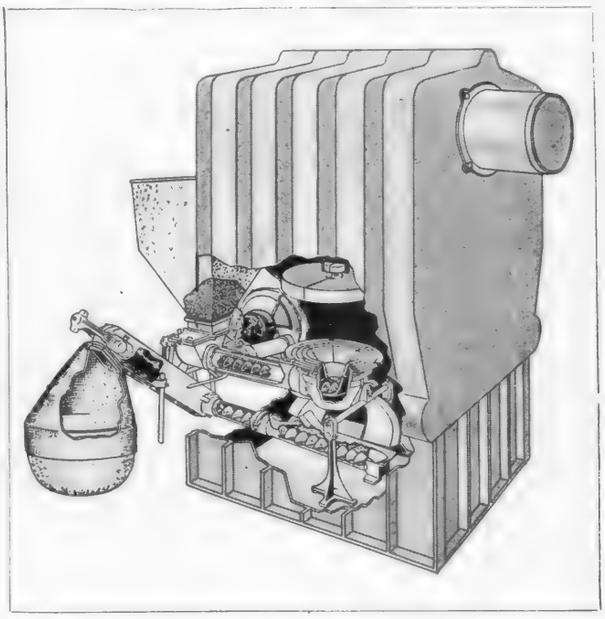


Fig. 11. Designed Especially for Small-Sized Anthracite This Stoker Also Provides for Automatic Ash Removal

Fig. 12. Warm-Air Furnace Installation Using Stoker Shown in Fig. 10

The Status of District Heating

Part VI— A Mid-Western Electric-District Steam Utility Plant Serving Three-Quarters of a Million Square Feet of Radiation

20-In. Steam Main Installed in Wooden Conduit

SUCCESS has attended district heating in Peoria, Ill., where the Central Illinois Light Company operates a system, the mains of which are shown in Fig. 1. Steam for the system is generated in the Liberty Street Plant, located on the Illinois River at the foot of Liberty St., and which is operated as a stand-by electric plant as well as a steam heating plant. The plant has 11 boilers which range in size from 500 B.H.P. to 1183 B.H.P. and have a combined capacity of 10,160 B.H.P.

Illinois screenings are burned on stokers of which the Taylor type predominates. Steam is generated at 200 lbs. gauge and is superheated 100° F.

Steam supplied to the heating mains ordinarily is passed through one or both of two Allis-Chalmers turbines, which are run non-condensing, one being of 3000 K.W. and the other 5000 K. W. capacity. Additional live steam is supplied to the district system when necessary through a make-up connection with a reducing valve. During 1927, approximately 8% of the steam supplied was live steam.

On December 8, 1927, this plant was called on to meet the greatest demand in its history, when the temperature hovered around zero and a strong West wind at times reached a velocity of 28 miles per hour.

During that 24-hour period the total delivery of steam was 4,449,000 lbs., and the highest peak reached for any one hour was from 11:00 A.M. to 12:00 M., during which period 205,700 lbs. of steam was delivered.

Delivery and Outside Temperature

A chart showing conditions almost as bad which were reached on December 30 and 31, 1927, is given in Fig. 3; here the top line represents the net thousands of pounds of steam delivered, the next lower line the outside temperature, the next lower line the pounds of pressure maintained at the plant, and the bottom line the pressure at the ends of the line.

Steam is delivered to the distribution system through three feeder lines, one being an 18-in. main, 1105 ft. in length, and two being 20-in. mains, totaling 2016 ft. The piping aggregates about 4¼

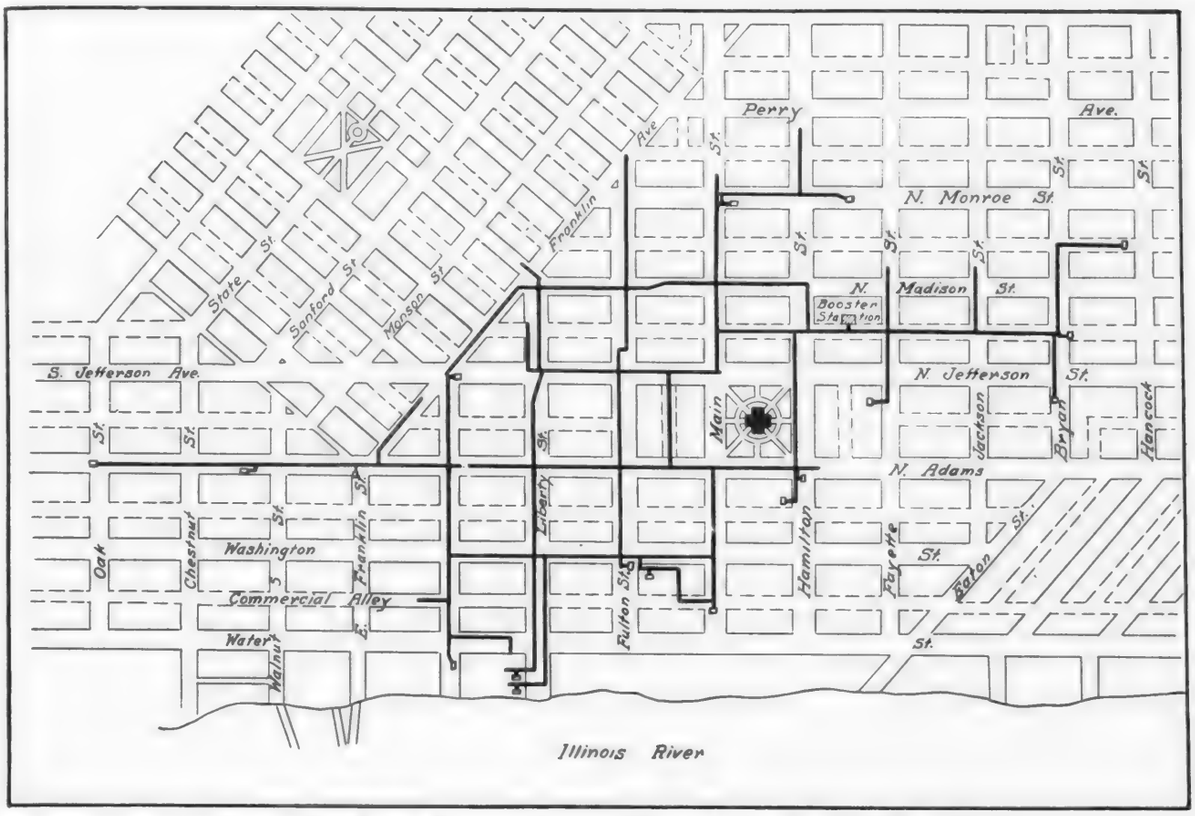


Fig. 1. Distribution System of Central Illinois Light Company, Peoria, Ill.

miles, and the sizes run from 20-in. maximum to 4-in. minimum.

While the original main, laid in 1902, is flanged cast-iron, practically all of the other piping is wrought iron with Adsco expansion devices and wood-log insulation.

The soil in Peoria is a good drainage medium, composed principally of sand and gravel, but this also introduces difficulties in installation as it is necessary to sheet-pile almost every trench to prevent caving in.

A typical main trench with piling, pipe and part

Fig. 2. Laying 16-In. Steam Main Under Railroad Tracks

of the wooden conduit in position is shown on Page 64, while a line carried under the railroad tracks and run in a concrete trench is shown partially installed in Fig. 2.

Co-operation with Heating Engineers and Contractors

It is the policy of this company to co-operate with architects in preparing plans and specifications for customers' installations, and to perform the necessary inspection work during construction of the heating system. A large number of heating systems supplied are two-pipe, low-pressure steam, with reducing valves on the mains, and with modulation valves and traps on the radiators. Many customers use thermostatic control.

Fig. 4. Power Plant, Central Illinois Light Company

Customers and Rates

In February, 1928, 412 customers were being supplied with steam for 763,000 sq. ft. of radiation. The installations vary in size from 200 sq. ft. to 28,000 sq. ft. of radiation.

All customers are charged the same meter rate which scales from $1.50 for the first thousand pounds per month down to $0.55 per thousand for all steam over 304,000 lbs. per month. A minimum bill of $40 per meter per season is rendered. During 1927, the average revenue received per M lbs. of steam sold was $0.576.

In this district coal of the 6-in. lump quality, obtained from nearby mines, is available at a price of $4.50 to $5 per ton, delivered. The same size of coal from other districts can be purchased for $5.50 to $8 per ton, delivered. Coke varies between $7.75 and $8.50 per ton, delivered, and oil for house-heating purposes has averaged, during the past heating season, about 6½ cents per gallon, delivered.

It would seem as if this were a very difficult field in which to sell district steam. Yet it has proved so satisfactory to the customers that this company actually heats every building of any consequence along its mains.

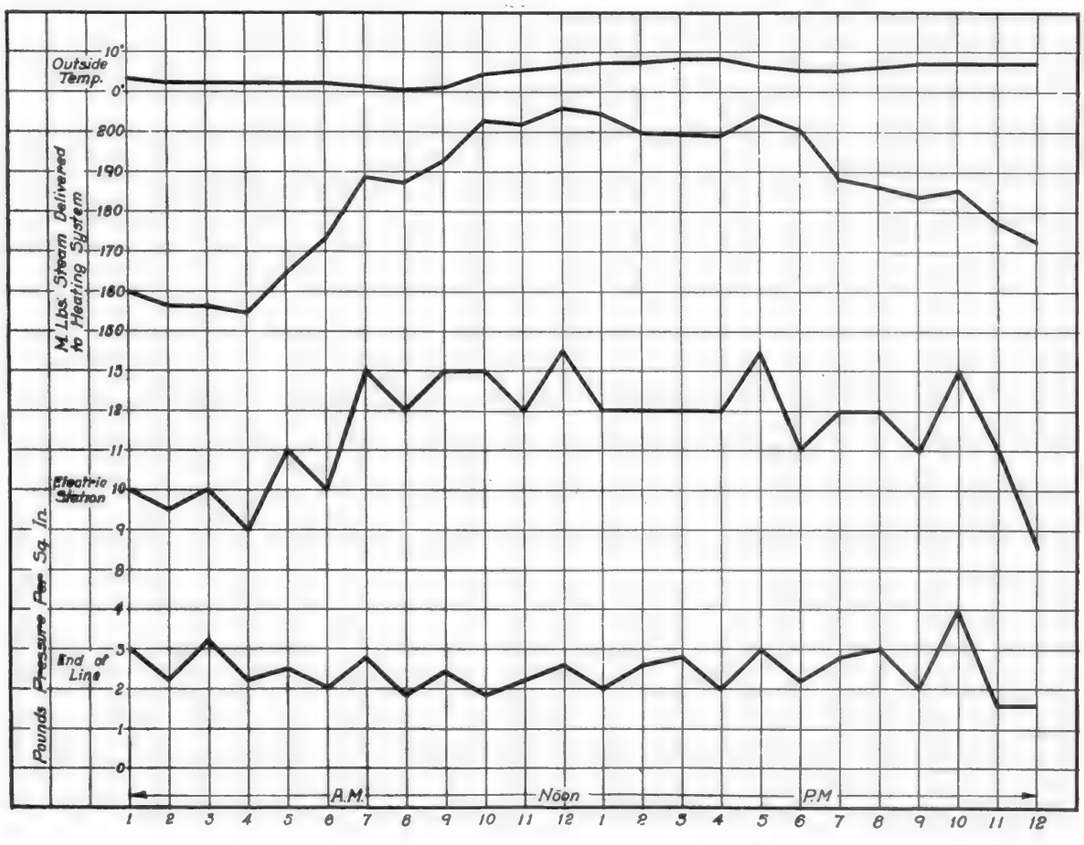
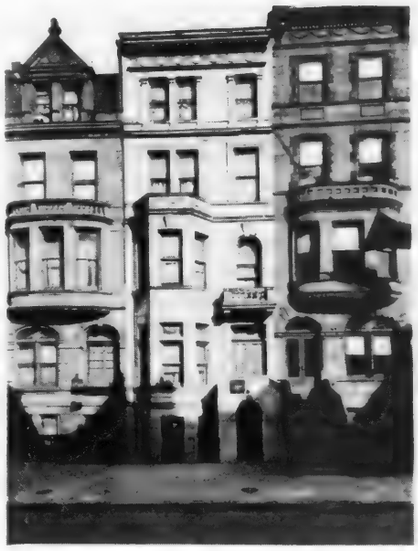


Fig. 3. Steam Output and Pressure Conditions During Severe Weather, December, 1927



Replacement Work Is Profitable

Metropolitan Contractor Builds Specialized Business, Avoiding New Construction

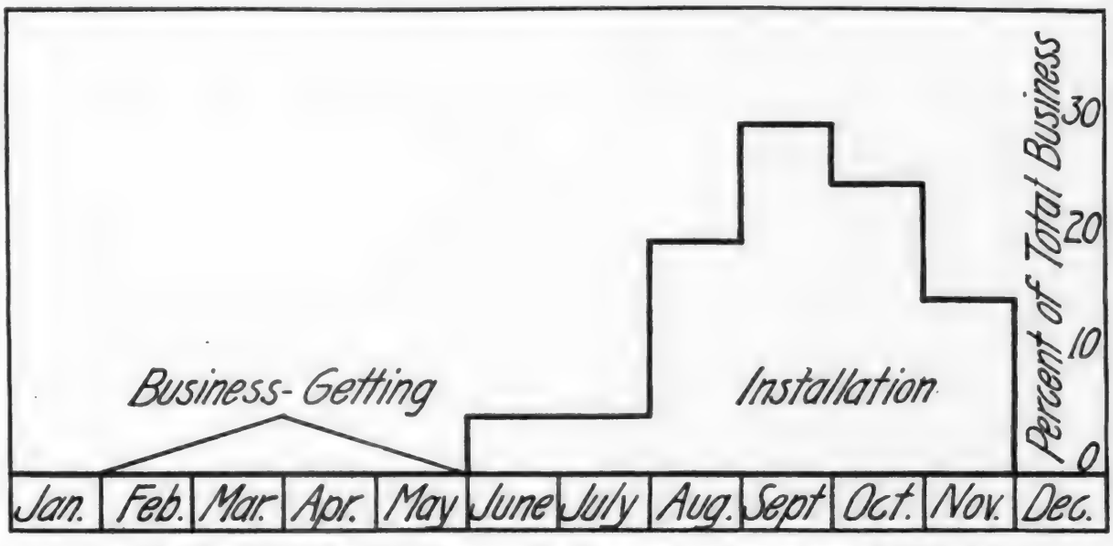
By R. Davie

FOR nearly five years I have practically limited my heating contracting to the replacement of old or unsatisfactory plants. My experience in the heating field goes back more than a quarter of a century—all but the last 10 years as a steam fitter and contractor in England.

After I had been in business in the United States for about four years, I began to realize that there were many limitations to the conventional method of carrying on a heating and contracting business and I began to analyze the situation. My own and, nearly as I could determine, my competitors' business grew at the rate of about 10% per year. I had been following quite closely the leading architects in my community and I found that their rate of growth just about synchronized with the expansion of the heating contractors who were my rivals. Therefore, I determined to specialize in replacement work and now I do nothing else. Looking back over the tremendous waste of energy incurred in business getting, and the comparatively small number of contracts "landed," I have been greatly surprised to find that a tabulation of my efforts during the last four years shows that I have secured substantially 85% of the jobs I have gone after, 5% were not done, and in 10% of the cases the prospect did not have the necessary funds or credit.

Quite naturally this is a seasonal business. From January to the first of June I do almost no construction work, carry no payroll, and my working organization might as well be in Miami or Timbuktoo. The approximate percentage of gross business carried out per month is shown on the accompanying graph. I spend four months of each year—from about the first of February until the first of June—soliciting business, making plans and getting ready for the season's work. By the end of October the last installation is completed, and during the following months it is only necessary to have two or three service men checking up on the operation of the different installations.

My business-getting methods are simple. I find

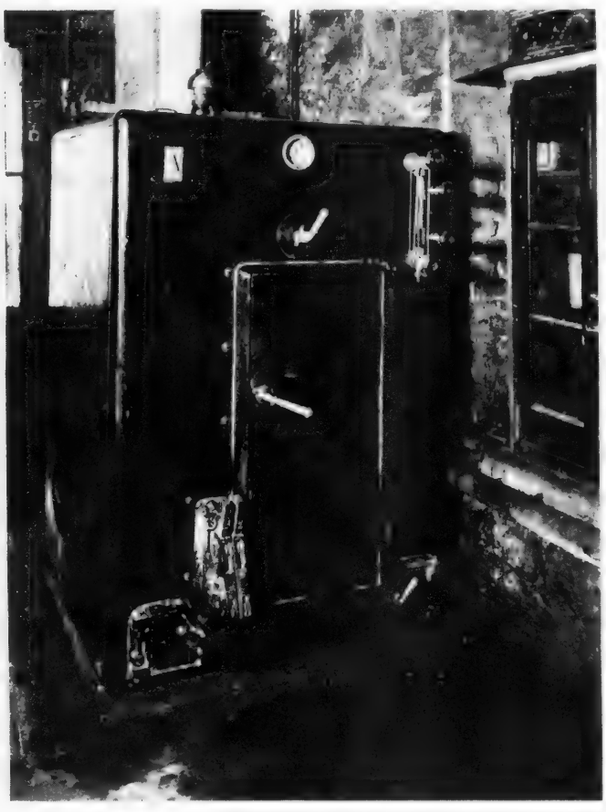


Graph Showing Annual Program of Heating Contractor Specializing in Replacement Work

that my satisfied customers are my best advertisement and, during the last four years, 50% of my contracts have come through them. The present season has developed a startling situation—*every single contract has come, directly or indirectly, through a previous client!* I make it a point to call on each of my customers three or four times a year if only to pass the time of day and to get the customer's word for it that his heating plant is entirely satisfactory. I usually try to get the names of three prospects from each of my customers. On an average I secure one contract from these three. I begin solicitation by a letter in February, and in April if the correspondence method has not produced results, I telephone and ask for an appointment. The responses to my letters have been very satisfactory as I am careful to make my written appeal brief and pointed. As I said, my rate of development under the old scheme was about 10% per annum, and since I have confined my activities to replacement work my business has increased almost at the rate of 40% per annum.

I am very careful to make my appeal to the prospect as a heating contractor and not as a plumber, and I believe that the average home-owner looks upon a man in the plumbing business as being a pretty poor individual to entrust with the design and installation of a heating plant.

In regard to prices, I find that the main desire of the customer is to have a square deal and to get his money's worth and he is perfectly willing to pay a good price for a good installation. From my experience I am pretty firmly convinced that a properly laid out and installed hot-water plant is the best for the average home-owner, at least in this part of the country, although it will cost from 25% to 33 1/3% more than a steam plant. Nearly every one here attends to his own furnace and I have kept out of one kind of trouble by refusing to consider undersized boilers. The greater part of my installations replace warm-air plants that have become obsolete or defective because of poor original construction.



Many of New York's Old "Brownstone Fronts" Are so Sound Structurally as to Justify the Installation of the Best Types of Heating Equipment

Piping Cannot Be Concealed in These City Homes

Stone and brick are the conventional building materials and at least 80% of my installations are in such homes. In consequence, because of structural reasons, I do not attempt to conceal the piping, but merely accept the situation and see that the risers are as unobtrusive as possible. I find that these installations cost from 5% to 8% more than they would have cost in a similar new house, put in during erection. I believe that the average heating contractor is afraid to undertake this kind of replacement work because it is new to him and he does not want to run the risk. Like every other highly specialized endeavor, this kind of contracting has its "tricks of the trade" but the difficulties generally are much overestimated. While I am not familiar with conditions in other parts of the country, I believe that a heating contractor in the smaller mid-western cities and towns would have an excellent chance of making a good thing out of this specialized work, largely because there are so many warm-air installations in houses that were built before the World War, and consequently are superior in relative value to the heating plants within them. It seems to me that stabilization of this kind offers the greatest opportunity to the single-minded heating contractor who does not dabble in plumbing and who desires to make the greatest progress. The work is clean cut, the profits are substantial, and, best of all, it is a non-competitive business, and does not involve a mad scramble of price-cutting to ultimately get one out of every ten jobs figured on.

In regard to labor I find no difficulty in securing all of the steam fitters necessary to carry through my peak load, which occurs in September. I "hire and fire" as may be necessary at the time. Of course such practice hinges upon the state of the labor market, but in my case this procedure has worked out very well. While I am not too exacting in my requirements, I make certain that the steam fitters I employ are first-class artisans and know how to put in piping and radiators with reasonable speed and accuracy.

Last year I installed 373 heating plants of which about 70% were hot water. The aggregate contracts on which I now am working will show a consistent increase over this figure.

British Boiler,

Burning Low-Grade Fuels,

Shows High Efficiency

A FIREBOX of a coal-burning steam heating boiler so designed that low grades of fuel can be burned with a CO_2 percentage in the flue-gas as high as 18%, a net thermal efficiency of 80.8% and an estimated saving in fuel cost of 8%, was described in a paper read before the summer meeting of the Institution of Heating and Ventilating Engineers, at Blackpool, Eng., by T. Roland Wollaston.

Orthodox methods of firing, using a flat-grate with fire bed of normal thickness, and based on the theory that convection plays the most important part in the transfer of heat from the fuel to the water, were disregarded in the experiments carried on by Mr. Wollaston. Results obtained from the original Bonecourt boiler and described by Professor Bone, and data published by the late Professor Nicholson, led the author to the conclusion that radiant heat is much more useful than convected heat in water heating and steam raising.

The Part Played by the Producer

Preliminary tests were made on a Cochran boiler, under which was an ordinary circular gas producer (Fig. 1). Two streams of air were supplied under forced draft, each stream being separately controlled. One jet of air formed carbon monoxide by the reaction of its oxygen with the incandescent coke, the gas accumulating at the top of the producer. This gas found exit through "Bunsen" orifices in the refractory dome. The other air stream, after absorbing heat from the red-hot dome, in passing over its surface, joined the first gas stream at the outlets of the multiple passages where combustion was completed. Consequently, whatever heat, potential or sensible, was released in the producer was wholly, or nearly so, effective upon the heating surface of the boiler.

The design of one of a pair of Cochran producer boilers, the first having been installed for the Manchester Corporation, is shown in Fig. 2. It will be noted that this differs to some extent from the design shown in Fig. 1, the producer working with fuel filled up to the central orifice, or firing hole, and the gas burning with secondary air, preheated by passage round the refractory lining, through seven Bunsen jets.

Ability to burn, with highest efficiency, the poorest and cheapest coke breeze and like fuels containing, for example, ash and moisture each up to or exceeding 30%, constitutes the outstanding value of this producer-type firebox. Such fuels previously had been used in other furnaces, but at lower thermal efficiencies, not approaching the results shown by the producer furnace. The boilers illustrated in Fig. 2 were tested by an engineer of the Manchester Corporation, whose report showed that, when using ordinary gas coke, the net thermal efficiency was 73.8%. On a later test, over a period of 14 days, the efficiencies appeared even better, 87.4% gross, or 80.8% net. Similar results repeatedly have been obtained on other producer boilers, even when working with the poorest coke breeze.

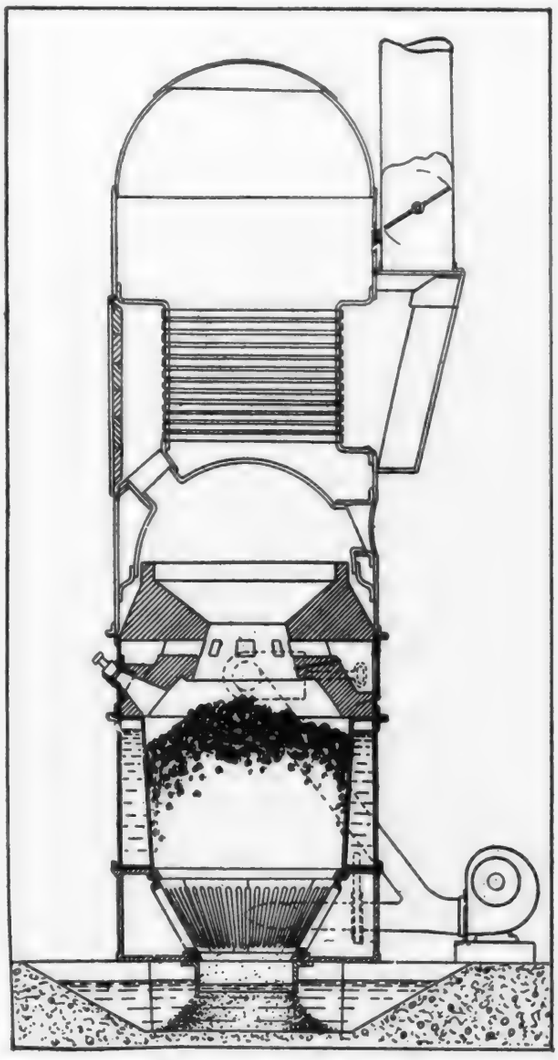


Fig. 1. Cochran Boiler with Ordinary Gas Producer Used in Early Tests

One of the original producer boilers was run for two weeks at the smoke-abatement exhibition at Birmingham, in 1926. During this test CO_2 recorders were connected to the boiler at all times, the general average of the CO_2 in the flue-gas being 17.5%. As the author states: "The work upon which I am now engaged, the attempted evolution of a boiler dependent mainly upon radiant transference, is no new conception, but previous investigators, working with solid or liquid fuel, have been handicapped by inability to approach perfect combustion, with consequent low flame-temperature and emission of smoke and soot. Obviously, with CO_2 in the flue-gas consistently between 17% and 18% these limitations largely disappear."

One of the most important advantages of the boiler is that the draft is practically balanced. This is apparent on casual inspection, but also is borne out by CO_2 records, which are alike whether the firing door is wide open or closed. It is obvious that no skill is called for in firing. All the fireman needs to do is tip the fuel into the furnace, where it piles naturally in the producer. Taking these two features together, it is seen that, by the installation of overhead bunkers, stoking labor almost disappears. As regards ash removal, again no skill is required. The ash is cold and moist as it comes from the water-sealed ash-pit. Consequently, there is freedom from dust and, except with very high ash fuels, the periodicity of ash removal is unimportant.

The author expressed the opinion that the common form of sectional heating boiler as a heat generation and transmission device, using lump coke as fuel, is a very much sounder piece of apparatus, scientifically, than the ordinary Lancashire, Cornish, or vertical boiler burning bituminous slack. If adequate draft, so as to maintain a fuel bed about 12 in. deep, is available; if the boiler is fired frequently, with small charges so as to keep the bed incandescent, and if the dampers are used intelligently, Mr. Wollaston thinks that 70% efficiency could be obtained without difficulty.

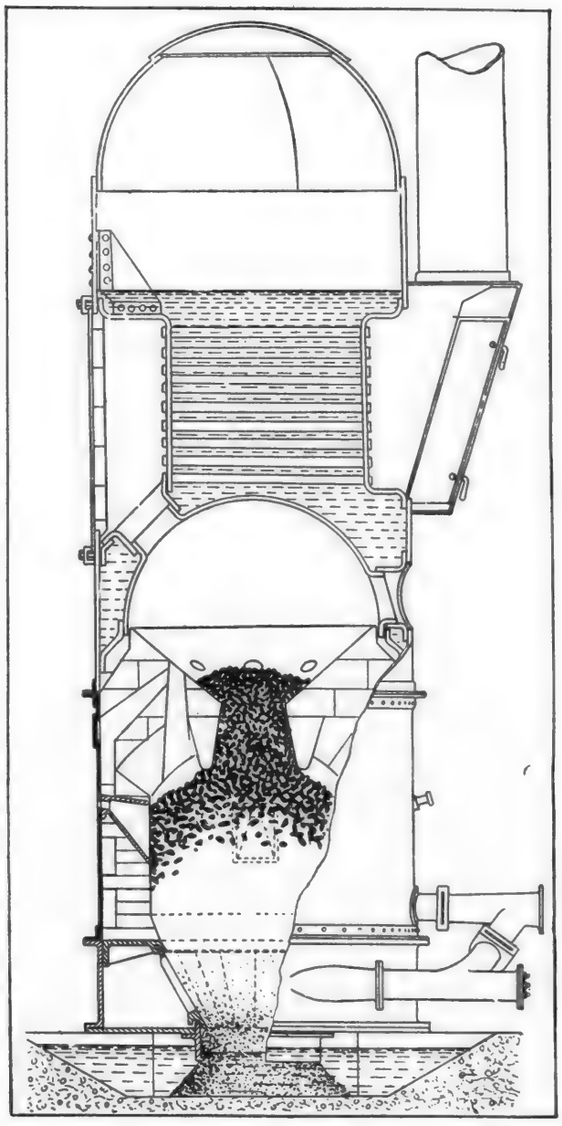


Fig. 2. Later Type of Gas Producer Used in Cochran Boiler

Domestic Stokers

(*Continued from Page* 63)

taining a continuous supply of the small amount of fuel required, so that a start-and-stop method is used. When the fuel and air supply is cut off in the forced-draft type (with a closed retort and small air openings), the fuel bed, with certain grades of coal, tends to crust over and to give trouble by burning or slagging down into the retort and closing the air openings; also when the feed again starts, this fuel bed breaks out in one place, giving a blow-torch effect through the ruptured portions of this crust, which materially reduces the effective furnace or grate area.

With certain grades of coal, trouble of the above nature is not in evidence, but with a coal of the low-fusing class this trouble may be serious and may mean the success or failure of the stoker in question.

Another point which should be given serious consideration, in stokers intended for residence and apartment-house use, is that of emergency operation by hand firing. No matter how "fool proof" the device may be, the fact must be recognized that for some cause, human or otherwise, the equipment may not function.

Proper functioning of a stoker installation not only effects a saving in the quantity of coal used but is the main factor in smoke prevention. The best way to stop smoke is not to make it; and this is what good combustion does.

Another factor, tending to economy of operation, is that a stoker will effectively burn a cheaper grade of coal than can be used by hand firing. This, together with the smaller amount of fuel used, often effects savings in dollars and cents that will pay for an installation in a reasonable time.

Heating and Ventilation Specifications

Part VI—Storage of Materials, Rubbish, Time of Completion of Contract, Payments and Price Schedules.

By Harold L. Alt

ANOTHER point which should be brought to the Contractor's attention is that of not storing his material at places on the premises where it is objectionable or interferes with the carrying on of the work by other contractors. This is covered in GC-20.

GC-20 STORAGE:

The Contractor shall confine the storage of materials and the operations of his workmen to the limits indicated by law, ordinances, permits, or by the Architect and shall not unnecessarily encumber the premises with his materials.

Specifications Nos. 1 and 2 do not mention this subject but Specification No. 3 contains the following:

STORAGE OF MATERIALS:

As the space for storage of materials is limited, the contractor shall assume full charge thereof, allotting the same to the various materials in such manner as will facilitate the work, prevent friction and maintain the greatest order and tidiness.

Specifications Nos. 4 and 5 also omit mention of this item, but Specification No. 6 contains the following paragraph:

STORAGE:

The several contractors will be required to provide suitable storage facilities of sufficient size to house their equipment as it arrives on the site. Equipment and materials intended to enter into the construction will not be allowed to stand exposed to the weather unless approved by the Superintendent, nor will the contractors be granted the privilege of storage in the building without the provision that it must be moved at the discretion of the Owner or the Superintendent.

Closely allied with the matter of storage of material is that of cleaning up the rubbish and debris accumulating during the work and remaining after its completion. In paragraph GC-21 this subject is covered to the extent usually necessary.

GC-21 RUBBISH:

The Contractor shall not allow waste material or rubbish caused by his employees to accumulate in or about the premises, but shall promptly remove the same, and at the completion of the work he shall remove all rubbish and tools, scaffolding and surplus materials from and about the building and shall leave his work thoroughly cleaned and ready for use. In case of dispute as to responsibility the Owner will remove the rubbish and charge the cost of such work to the Contractors, pro rata.

Specifications Nos. 1 and 2 do not mention this item but Specification No. 3 elaborates on it as follows:

REMOVAL OF RUBBISH:

Under no circumstances shall rubbish be allowed to accumulate in the building or on the premises. All dirt and rubbish resulting from the work shall be removed from time to time, and as often as may be directed by the Commissioner.

The contractor shall construct tight, strong chutes where directed, connecting each story with the ground. All rubbish shall be lowered through these chutes and hauled away immediately. Under no circumstances shall materials be taken in or rubbish thrown from the windows of the building. When directed all rubbish shall be wetted down before being removed.

On completion of the work, the building, premises and adjoining streets and alleys shall be made neat and tidy by the contractor, and the building delivered clean, whole, tight and fit for immediate occupation.

Specifications Nos. 4, 5 and 6 do not mention anything on the subject of rubbish.

Time of completion frequently is the essence of a building contract, inasmuch as delay beyond the allotted time may result in financial loss to the owner.

It is customary either to give a date upon which the work is to be completed (this usually being followed in the general contractor's contract) or to state that the installation must be completed by the

GC-22 TIME OF WORK:

The work shall be commenced [1][as soon as the condition of the building will permit] and shall be carried on at such points, in such order, and at such times as the expedition of the work requires, or as directed by the Engineer (or Architect) and must be completed prior to [2][the time of completion of the building].

This work shall be done in conjunction with the work of other Contractors, and must be done so as not to obstruct or retard any other work. Note . . . . If a definite date is to be specified substitute it for [1][. . . .] and [2][. . . .]

time the building is finished (this phrase frequently being used in the mechanical-equipment contracts). GC-22 provides for the use of either phrasing, as well as covers the time when the work shall be commenced.

Concerning the matter of time, Specification No. 1 covers this as follows:

TIME OF COMPLETION:

The time of completion is one of the essential considerations of the contract. The Contractor shall state in his proposal the time in which he agrees to have the work completed if the contract be awarded him. Work shall progress with a proper and sufficient force of men and ample supply of materials to assure completion of the building within the time agreed upon and stated in the contract.

Specifications Nos. 2 and 3 do not say anything about time of completion. Specification No. 4 covers the matter very briefly but, at the same time, very well.

TIME:

The entire plant shall be completed by the time the building shall be finished. It shall be installed as rapidly as the progress of construction of the building will permit.

Specification No. 5 devotes more space to this item as follows:

TIME:

The Contractor shall commence work at the building on such date as the Superintendent shall notify him to begin. The place where the work is to be begun will either be stated in a notice from the Superintendent, or designated on the ground by the Inspector. The time fixed in the advertisement for the completion of the work shall begin to run on and from the date so notified, but the commencement of work by the Contractor without notice shall be deemed and taken to be a waiver of notice on his part.

The word "completion" shall mean full and exact compliance and conformity with the provisions and requirements, expressed or implied, in the specification and the drawings accompanying and forming part of the same, including all amendments, revisions, corrections or additions, duly authorized.

To insure against the contractor being delayed through inability or failure of manufacturers to make deliveries in the time allowed, it sometimes is desirable to demand a schedule showing the dates when the manufacture of special apparatus shall be commenced and also the dates when various portions of the work shall be completed. This may be covered in a brief manner as follows:

GC-23 (Continuation of GC-22; use when desired)

The Contractor shall, if required, prepare in consultation with the Engineer (or Architect), a schedule fixing dates for the beginning of manufacture and installation of materials and for the completion of the various parts of the work.

In the matter of payment the contractor is vitally interested. In order to finance the work he must know when payments will be due and payable, and the larger the percentage payable as the work progresses the easier it is for the contractor to finance his part of the work. At the same time sufficient funds must be retained by the owner to cover any reasonable contingency and loss, especially in case the contractor should fail or become financially involved during the progress of the contract.

When the contractor is bonded for the full amount of his contract it falls upon the bonding company to complete the work under all the conditions of the original contract by which the contractor was bound. In such cases the percentage of payment safely may be made higher, usually in

GC-24 PAYMENTS:

Payments to the Contractor on account of work done under these specifications will be made monthly upon the certificate of the Engineer (or Architect) to the extent of. . . .per cent* of the value of the material installed and the labor furnished; the remainder to be withheld for thirty days after completion of contract and acceptance of the work by the Engineer (or Architect).

Applications for payments shall be made on forms provided or approved by the Engineer (or Architect) at least one week before each payment becomes due. Payments on account are not to be considered as acceptance of the work.

The Contractor must, if demanded by the Engineer (or Architect), give a sworn statement of all claims and liabilities for labor and materials outstanding against the work before a certificate for final payment is issued.

The Engineer (or Architect) may hold up the payment of amounts due the Contractor at any time, until any lien then existing has been properly satisfied or bonded. Upon completion of the work, the Contractor shall deliver to the Owner a complete release of all liens arising out of this contract.

The Engineer (or Architect) may withhold or nullify any certificate, or reduce the amount thereof, if violations of the contract exist, and such certificates may be withheld until such violation is corrected to the satisfaction of the Engineer (or Architect).

(*) 85% to 90% for bonded contracts.
75% to 80% for unbonded contracts.

the neighborhood of 90% of the proportional value of the work installed each month. Where no bond is given, the owner must retain sufficient funds so that in the event the contractor fails to carry out his contract with due diligence and in a satisfactory manner and it is necessary to abrogate the contract, there will be sufficient amounts unpaid on the work to permit the immediate employment of another contractor to finish up the incompleted portion. GC-24 is one form of specifying payments, and includes a sworn statement of outstanding liabilities as well as liens, and provides for withholding of payments as long as violations of the contract exist.

Specification No. 1 covers the matter of payments as follows:

PAYMENTS:

Payments on account for work done will be made in the amounts and periods as will be agreed upon and stated in the contract.

Liquidated damages for the non-fulfillment of contracts on time and premiums for the completion of the work ahead of the contract time, if any or both, also shall be agreed upon and embodied in the contract.

No certificates for any payment will be issued unless the requisitions therefor are made in triplicate on the forms which must be approved by the Owner.

FINAL PAYMENT:

The final payments will not be paid by the Owner until all or any of the defective work shall have been made good to the complete satisfaction of the Owner or Architects, and all the incidental damage caused thereby shall have been repaired, and until all the accounts for extra work and materials and allowances for omissions have been rendered, agreed to and made part of such final payment, and not until the contractor has furnished satisfactory evidence that there are no outstanding liens or claims for materials furnished or labor performed on any part of his work.

Should the Owner deem it inexpedient at the time of the completion of any contract, to have any defects or deficiencies corrected, he shall have the right to deduct from the contract price an amount to be agreed upon between the Contractor and the Owner, or determined by arbitration as more definitely defined by the terms of the contract.

Specification No. 2 leaves the matter of payments to be taken care of in the contract executed between the owner and the contractor.

In Specification No. 3 the matter of payments is arranged in accordance with the following:

ESTIMATES:

For the purpose of expediting estimates for the issuance of certificates of payment, the contractor shall, upon request from the Commissioner, furnish a true statement of the cost of each subdivision, as set forth in these specifications.

Payments on account of contract will be made from time to time as the work progresses. All payments will be by checks drawn on the Board's depository. Detailed estimates based on the value of the work done and materials, fixtures and apparatus actually in place in the building, shall be made out by the contractor, on blanks furnished for the purpose, and submitted to the Commissioner for his approval at least one week before the payment will be required. If desired by the Commissioner the contractor shall submit therewith an itemized statement of the quantities and cost of materials involved and the proportionate share of profit included. Fifteen per cent of each estimate will be retained until the final acceptance of the work.

The payment of any estimate, or examination of any work, materials, fixtures or apparatus by the Commissioner, shall not be considered as an acceptance of the work, materials, fixtures, or apparatus previous to a final examination and acceptance by the Commissioner.

Specification No. 4 also leaves the matter of payments to be settled in the final contract and No. 5 treats the matter in the same way.

Specification No. 6 calls for 90% payments as well as a price schedule.

PAYMENTS:

Payments of 90% of the value of the work executed and satisfactorily in place, as ascertained by the Engineers, acting through a duly authorized agent of the Owner will be made monthly if desired by the Contractor, and payment of the 10% retained will be made after the final acceptance by the Owner of all materials and workmanship embraced in the contract, but payments will not be made until every part of the work to the point for which payment is claimed is satisfactorily supplied and executed in every particular and all defects therein remedied to the satisfaction of the Engineers.

The Owner reserves the right to withhold any payment until satisfactory samples, certificates, and shop drawings, that may be hereinafter mentioned, are supplied in accordance with the specifications' requirements.

PRICE SCHEDULE:

Before signing the contract, the Contractor shall file with the Engineers a full and completely itemized schedule proposal, giving quantities and prices of the materials and labor required by the contract. The complete schedule shall include everything required in the execution of the contract and the total must be equal to the amount of the contract price.

(*To be continued*)

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DIRECT radiation in its evolution has passed through so many stages that it will not be at all surprising to see it undergo further development. Starting with the simple pipe coil, we had the pipe-tube radiator, then the column type, both plain and fancy. During the vogue of the column type we had our first experience with sheet-iron radiators, which, in their later form of brass and copper, were to make so large a place for themselves in heating work. As everyone knows, column-type radiation has been succeeded by tube-type, while copper and brass radiators have paved the way for the development of the "invisible" or "concealed" heaters of the present day.

In all of this evolution, except the last-mentioned, greater effectiveness or lower cost, or both, were the objects sought. Then, suddenly, the viewpoint changed. The introduction of comfort-giving household appliances led to an attitude on the part of the home-owner that, after all, neither cost nor efficiency was the prime consideration. Suddenly it was realized that what the home-owner wanted above all else were appearance and convenience. The fact that concealing a radiator was bound to reduce its effectiveness did not deter him in the least from adopting that type, any more than the wastefulness of indirect illumination deterred those who appreciated the advantages of diffused light.

"Concealed" heaters, then, were produced to meet a definite demand and their popularity today is not dependent on their effectiveness, as compared with other types of heating surface.

With this distinction clearly in mind, it is in order to discuss, as Konrad Meier does in this issue, the present status of radiation in general and whither the trend is leading. If, as he points out, the task of the future is to produce a heating surface which will satisfy all the demands for thermal efficiency, hygienic quality, practical needs and aesthetic appearance, it is reasonable to suppose that we shall produce types far different from those we have been using.

In his discussion of the trend in radiator design, Mr. Meier lays due emphasis upon the desirability of securing the correct radiating effect on the exposed sides of a room. To this end he maintains that "the surface should be low and spread out at least for the length of the window." At the same time, to secure full thermal efficiency, "radiators should present flat broad surfaces to the front, and extended surfaces in the rear."

IN view of recent research bearing on the radiating effect of heating surfaces and the proper application of the heat, it is worth while to repeat the views expressed by Mr. Meier, as far back as 1918, in a paper presented to the American Society of Heating and Ventilating Engineers. Under the general title of "Economy in Heating," he had this to say in connection with the application of heat:

> "Modern conditions demand, of course, that we shall give the tenants of a building comfort wherever they might require it. Nevertheless, it is possible to concentrate the heating effect in such places and at such times as most needed —for instance, where people are likely to rest or to study, while localities that are used only in a transient way should receive no more than a tempering. To carry out this idea, we should see to it, for instance, that living and working rooms have a moderately warm floor and that the radiation is applied in agreeable, mild form, allowing direct action in about the right place. It will be found, that the general heating of the room, for equal feeling of comfort, may then be kept down appreciably.
>
> "Experiments have lately been made concerning the best location of a radiator in the room, whereby the comparative rate of heat emission was determined. In the opinion of the writer, such tests also should establish the best place for the radiator *in reference to the amount of heat required to secure comfortable conditions for particular parts of the room*, for instance, near the windows, where this is most essential. It might be found, for example, that the interior location of high radiators calls for decidedly more heat than low single-column heating surfaces underneath the windows, because the former radiates less and heats more air, which rises to the ceiling and creates a current of cold air from the outside wall. The result is a cold floor and a hot ceiling, with considerable leakage overhead and indraught through doors and windows."

Refrigeration as Applied to Industrial Air Conditioning*

By R. W. Waterfill
Refrigerating Engineer, Carrier Engineering Corporation

THE purpose of this paper is to point out the developments in progress for the adaptation of refrigeration, as formerly applied to ice making, to the more recently developed field of dehumidifying and air conditioning. It therefore would seem pertinent to compare the characteristics of the many developments available.

From an energy standpoint, refrigeration is the elevation of a given quantity of heat from one temperature level to a higher temperature level. In any given installation made for a fixed duty, the low-temperature level is a specific and constant value, depending on the purpose and requirements of the installation. The high-temperature plane to which the heat is to be pumped is the variable, which is governed by the character of the natural forces, which are used to remove the heat at the higher plane, and the extent to which these natural forces are consumed. The factors which fundamentally govern the ultimate temperature head at which the total heat involved must be disposed are: the initial temperature of the cooling medium or condenser water, the quantity of condenser water used, and the efficiency of the condensing surface in removing the heat from the refrigerating medium with the lowest possible temperature difference between the refrigerant and the condenser cooling water. The power required to produce a ton of refrigerating effect with any refrigerating medium in any system, increases with the saturation temperature difference between the condenser and cooler vapors.

Refrigerating Requirements of Air Conditioning

Air conditioning, including dehumidification, passed out of the experimental stage long ago and has seen many instances of successful application within various industries.

While the refrigerating requirements for air conditioning involve the same basic principles as for other refrigerating work, there are differences which make it desirable to treat air conditioning refrigeration from a different point of view than that considered in ice making or other low temperature work. The differences primarily are that air conditioning refrigeration requires very large heat capacities, which need be handled only at low temperature heads. Ice making and other low temperature work ordinarily require that the heat be pumped through a much greater temperature range. The analogy to which this might be compared is the use of fans for handling large volumes of air at low-pressure differences, as against compressors designed to handle small quantities of air but at relatively high compression ratios.

Air conditioning applications may be divided into two general classes. The first of these is industrial or process conditioning where the refrigeration is employed for the purpose of maintaining low temperatures or relative humidities or both, for the improvement of the product under process of manufacture, or making the manufacturing process independent of climatic conditions. The refrigeration for this phase of air conditioning may be required to produce temperatures anywhere from normal summer conditions down to zero degrees, or even less. The majority of cases in this class of work, however, will fall in the temperature range requiring cold water or dew-point temperatures from 35° to 60° F.

The second major application of refrigeration to air conditioning is that employed in auditoriums or other places of public assemblage. The purpose of this refrigeration is to provide comfort for the patrons of the auditorium. This field of air conditioning is large and has become very important both from the standpoint of its benefits to the public and to the promoters of public enterprise. The range of cold water temperatures or dew points to be maintained for this purpose, is fairly narrow and well defined and as employed may be considered to be covered in the range of 40° to 55° F., though the best results are generally secured with a dew-point temperature of about 50° F.

In either of the applications it is desirable to have equipment which will produce the results efficiently and with minimum attendance. This efficiency should easily be maintained throughout the life of the equipment at approximately that demonstrable when the equipment is new and first installed. For economy of operation and satisfactory maintenance of atmospheric conditions, it also is desirable that the equipment permit of automatic regulation of a constant cold-water temperature.

For air conditioning where cold-water temperatures above the freezing point of fresh water are permissible, the most efficient method of heat transfer is by direct spray of the refrigerated water into the air current. This gives a very efficient heat transfer surface so that air may be cooled approximately to the temperature of the cold water leaving the spray chamber. This method of heat transfer, combined with an efficient cooling surface for the refrigerated water, permits of the maintenance of dew points very close to the temperature of the refrigerating medium on the low side

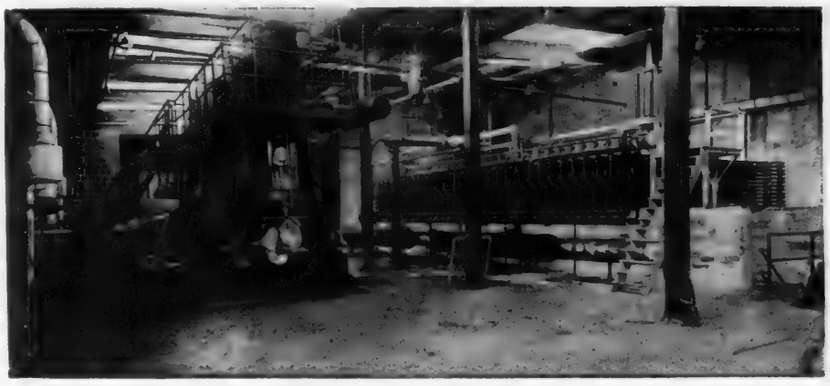


Fig. 1. Positive Compression System with Double-Pipe Condensers

*From a paper read at the semi-annual meeting of the American Society of Heating and Ventilating Engineers, West Baden, Ind., June 29, 1928.

of the refrigerating system, a condition essential to operating economy.

Refrigerating Mediums

Refrigerating fluids are merely heat carrying mediums which, during their cycle, absorb heat at a low temperature level, are compressed by a heat pump to a higher temperature, where they are able to discharge their absorbed heat together with that added during the pumping, to the condenser cooling water. The ideal refrigerating medium would be one which could discharge to the condenser all the heat which it is capable of absorbing in the cooler.

The four most important of the refrigerating mediums, in machines of five tons and larger, are ammonia, carbon dioxide, dieline and carrene. These refrigerants cover all the variations employed in the general compression refrigerating systems. All of the other refrigerating mediums have been employed in efforts to overcome some of the minor disadvantages which have appeared in previously employed substances, or to meet special applications. These other refrigerants in general, however, have introduced in the main, disadvantages far in excess of the advantages.

Ammonia is a very efficient and workable fluid usually employed in piston type or positive displacement compression machines, though it has been used to some extent in centrifugal machines of very large capacity. The working pressure range for air conditioning is approximately 30 to 50 lbs. gauge on the low side, and 180 to 225 lbs. gauge on the high side.

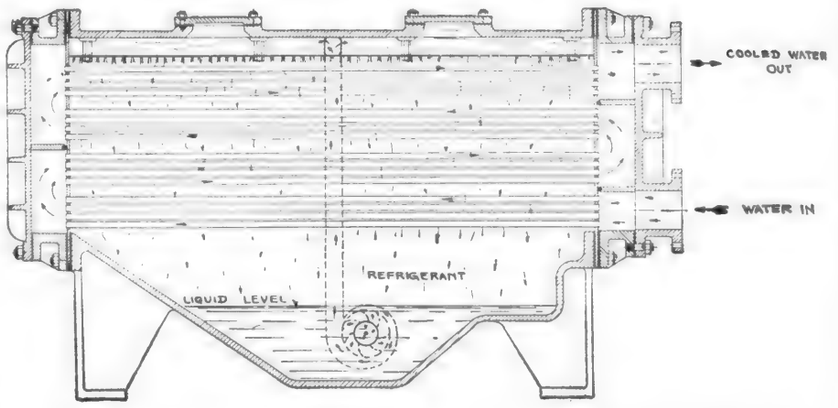


Fig. 3. Construction of Water Cooler in Centrifugal Refrigerating System

Carbon dioxide is the only medium employed in piston compression systems, which has sufficiently marked safety advantages over ammonia to warrant its substitution, where safety is the chief concern. As compared to the latter, however, it has some disadvantage in the basic efficiency of its thermodynamic cycle owing primarily to its low critical temperature of 88° F. Its working pressures range from 400 to 1400 lbs. per sq. in. gauge.

Dieline and carrene are only applicable in non-positive types of compression systems. Both of these refrigerants are water white liquids at normal atmospheric conditions, and may be handled freely in open containers very much as water is handled. The working pressures on both sides of the system are below atmospheric; that is, the entire cycle of the fluid is completed under vacuum.

Dieline is slightly combustible when ignited with a flame, but the products of combustion generally will blanket and extinguish the flame. Carrene, which may interchangeably be used in the same refrigerating system, is non-combustible.

Refrigerating Mechanisms

For the conversion of energy in the various forms of useful work, machinery has been evolved and carried through various stages of development and improvement, with the object of increasing its efficiency, simplicity, dependability and automatic performance. History shows that, in general, piston type engines, pumps, compressors, etc., were the first developed. Later centrifugal, or free rotating units were devised and soon established themselves. These are the steam turbine, centrifugal pump, centrifugal fan, centrifugal blower and centrifugal compressor, as well as electric motors. The piston type machine and the centrifugal, or free rotating type machine each, in general, have their preferred field of operation. As a general rule, the centrifugal unit is best adapted for fairly large sizes and relatively low pressures, while the positive piston type machine finds its field of usefulness in smaller capacities and high operating heads; *i.e.*, ventilating fans contrasted to compressed air garage pumps.

In the present state of development it would seem that centrifugal machines are commercially applicable only to the larger capacities, and certainly not below about 50 tons in a single unit. For all smaller capacities, positive compression machines have inherent advantages in first cost and, to some extent, in operation. In the smaller capacities, centrifugal machines must either increase in speed or else operate at reduced efficiency. In the small positive compression machines an increase in speed is desirable and there is but little disadvantage in efficiency in the smaller sizes. There are many other considerations determining the type of compression to be employed, as, for example, whether a steam engine or steam turbine drive is

Fig. 2. Centrifugal Refrigeration Installation

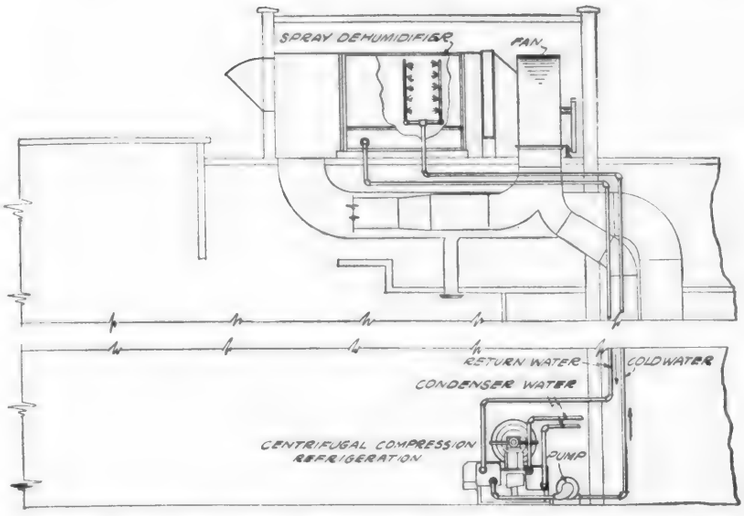


Fig. 4. Dehumidifying System—Centrifugal Refrigeration

preferred in steam driven units. It is obvious that a centrifugal type of unit is not adapted for steam engine drive and conversely positive compression is not so well adapted for steam turbine drive.

While the majority of refrigeration installations for air conditioning are of the compression type, there still are employed a number of ammonia absorption units. This is one of the oldest methods of refrigeration and has found favor where large quantities of waste heat in the form of low-pressure steam are available.

Absorption systems, however, seldom have been used in air conditioning work as they are best adapted to low temperatures. Increased back pressures occurring in air conditioning work do not give the advantage in this type of equipment that they offer in the positive compression machines, and the cost of the absorption system in general is more than for compression systems. It is quite possible, however, that for small units the absorption system may find increased favor as it has possibilities of automatic operation and freedom from moving parts that cannot be obtained in the compression system. It is particularly well adapted where low-pressure steam is continually available, or gas may be used as a fuel for operation.

New Development in Absorption Media

In addition to the older type of ammonia absorption machines, there are two new types of absorption machines coming into use. One is the hydrogen filled machine now in use only in gas-fired household refrigerating machines, and the other is an absorption machine using solid absorbents, such as silica gel. Both of these systems have possibilities for further development. There also is a system being developed which is gas-fired but which is not an absorption machine. It is really a compression machine using mercury vapor as the ejector medium. This machine uses water vapor as the refrigerating medium. It is quite possible that one or more of these systems eventually will be developed for the cooling and air conditioning of our homes in summer, and for other places where only relatively small quantities of refrigeration are required.

The piston compression machines were first employed in the latter half of the nineteenth century. They generally are connected to baudelot coils or bunker coils on the low side, for air conditioning. The baudelot coil construction consists of a series of pipes made up to form a vertical coil or stand. Several of these stands are placed together to form a bank, the number of stands required depending on the capacity of the installation. These coils are placed in an insulated room with a water tank at the bottom. The water to be cooled is distributed by drip troughs, and runs down over the coils. The refrigerant is expanded or vaporized within the coils, thus absorbing the heat from the water flowing on the outside. The water, when cooled, is then pumped to a dehumidifier through which the air to be cooled is passed. The water then is returned by gravity to the baudelot tank and recooled.

A slight variation of this method of water cooling is to have all the coils submerged in a tank of water. The water is kept in continuous motion at high velocity, by a separate agitator to maintain high transmission efficiency.

Another type of dehumidifying system in quite general use consists of a number of direct expansion coils placed within the dehumidifier, the water being distributed over the coils as in the baudelot construction, but in this case the air is cooled by contact with the wetted coils and water, placed directly in the air stream. The simplicity of this arrangement permits of a very low initial cost of the installation. Brine or direct expansion is used within the coils, preferably brine.

The condensing equipment has taken many forms, but is usually some modification of the atmospheric, double pipe or the shell and tube condenser. In the atmospheric type, water is showered over the outside of the stands of connected piping. The double-pipe system has one pipe threaded throughout a bank of large pipe, the joints being either welded or made up with glands. The shell and tube condenser may be either horizontal or vertical, open or enclosed.

Fig. 1 shows a large steam-drive, positive-compression installation with double-pipe condensers arranged in a bank on an elevated platform. The general practice is to locate the compressor and drive on foundations in the engine room and place the cooling and condensing equipment wherever convenient, connecting these units with pipe lines for the

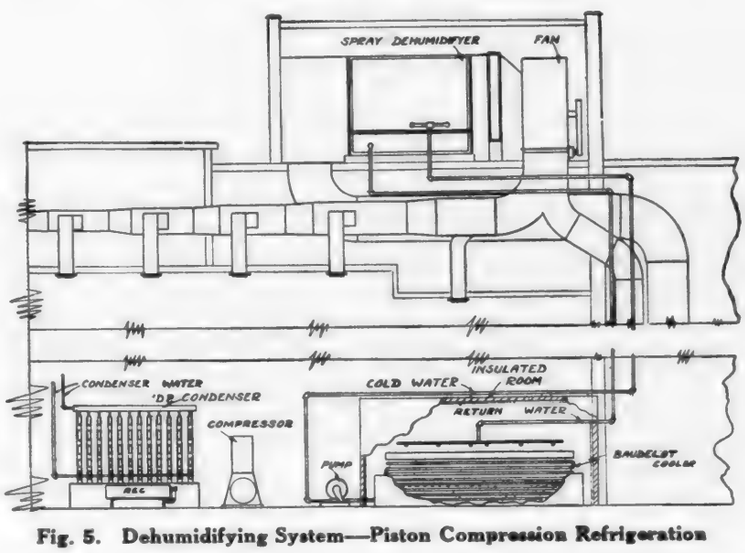


Fig. 5. Dehumidifying System—Piston Compression Refrigeration

circulation of the refrigerating liquid and vapor. Here the compression and condensing units are in the engine room and the baudelot, or cooler surfaces, located elsewhere.

The centrifugal compression machine is of comparatively recent origin, having made its first commercial appearance in 1923, in connection with air conditioning in the chocolate dipping room of a large candy factory in the United States.

All the units of this system are erected in a compact assembly. Fig. 2 is a typical installation showing the water piping connections to the closed water circulation systems of the condenser and cold water cooler. The compressor and drive are mounted directly on the shell and tube type cooler and condenser, which serve as a subbase. The assembly generally is set directly on the floor. The compressor may be direct connected to steam turbines, which will run at their normal speeds. Turbines may be thus employed for all steam pressures, even as low as 2-lbs. gauge. High speed electric motors often are used to drive the compressor direct connected, also variable speed motors connected through step-up gears.

Automatic Regulation with Centrifugal Compressor

The characteristics of a centrifugal compressor make it adaptable to automatic regulation of the cold water temperature, regardless of the load. The general method of doing this is by controlling the flow of cooling water to the condenser. This means that the consumption of condenser water always is governed by the amount of refrigeration load, thus insuring the economical use of condenser water. Further regulation may be had by variable speed, which reduces power required at reduced loads. This method of regulation is particularly desirable where material economy cannot be effected by condenser water reduction. This is the case for very cheap or fixed condenser water costs, as when water is pumped from rivers or in cooling tower circuits.

In the centrifugal system, the fresh spray water for the dehumidifier may be cooled direct in a shell and tube cooler. Fig. 3 is a standard shell and tube cooler, showing the method of heat transfer from the refrigerant to the cold water and the general water and refrigerant circulations. A shell and tube condenser functions in the same manner without danger of water freezing within the tubes, for the reason that the centrifugal compressor tends to maintain a relatively constant temperature head just as the centrifugal pump tends to maintain a constant hydraulic head. The capacity of the compressor automatically adjusts itself to the load imposed and maintains a constant temperature of the cooled water.

A completely centrifugal dehumidifying air conditioning installation is shown in Fig. 4, and a similar arrangement for a piston compression type installation is shown in Fig. 5.

One of the peculiarities of the refrigerants available in the centrifugal system is that they are solvents of oil. The cooler and condenser surfaces, being continually showered with the refrigerant, are thus washed and kept clean, insuring a high maintained heat transmission rate. However, as there is no internal lubrication of a centrifugal compressor, no oil is introduced into the refrigerant passages.

The general construction of the centrifugal compressor is very much like the multi-stage centrifugal pump.

Guide Publication Committee Faces Problem

It would appear, from the report of the *Guide* publication committee, that the issuance of the *Guide* at annual intervals is meeting with objections on account of rapid progress in the solution of technical problems in the industry and the ever-changing character of trade advertising. Perry West, chairman, commenting on the situation, said:

"Ten years ago heating and ventilating was a dead science, we knew all there was to be known about it. Less than two years ago we concluded that the *Guide* should be published bi-annually as there would not be enough new technical and catalog data to warrant a change every year.

"Today we know that this period of our science died aborning and that the *Guide* must soon be revised twice a year or be obsolete.

"Just a few of the items are—the old cast-iron column radiator for which we had all of the research data and tables, is no more, and in its place we have the small tube radiators, the radiant radiators, the concealed heaters and heat cabinets; types of boilers less than five years old have given way to newer and very different types; the idea of heat emission with regard to heating comfort is revolutionizing our radiator design and testing methods; unit systems of heating, ventilating and air conditioning are revolutionizing the heating and ventilating of industrial and public buildings; gas and oil heating are revolutionizing residence heating; better knowledge of the difference between summer and winter time indoor conditions is modifying air cooling; better study of prevailing winds and their relation to low temperature is changing our minimum temperature and exposure factors for heating; co-operation with the Heating and Piping Contractors National Association, the Heating and Plumbing Industries Bureau, the American Standardization Committee, the Committee for the Prevention of Waste and other such agencies in making for better understandings. The very latest and best data on all of these new subjects is being incorporated in the *Guide*.

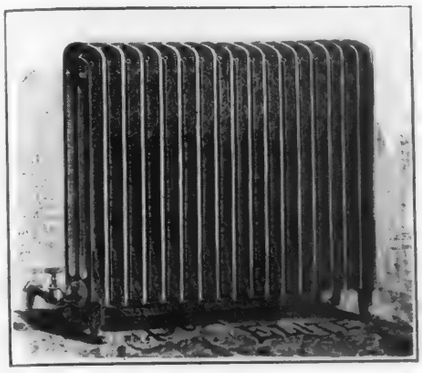
"There is much research work needed, however, and much data to be gotten from manufacturers and associations connected with these new products. Each member of this society should vitally interest himself in the collection and compilation of the data needed along these lines.

"In addition to this we are following out our original program for the improvement of present chapters and the introduction of new ones.

"We have splendid new chapters on central heating, installation and operation of mechanical equipment in U. S. Treasury Department Building, kitchen, laundry and hospital equipment, fan furnace heating, water and oil heaters, pipe fittings and valves."

Little Profit for Heating and Plumbing Supply Houses in 1927

Information that 85 heating and plumbing supply houses in the United States, constituting a typical group, showed an average net profit of only 1.6% in 1927, was contained in a report compiled by the Harvard Bureau of Business Research. The typical gross margin, for 1927, was 20.2% of net sales, and the total expense, before interest, was 18.7%, so that, with a total expense including interest of 20.8%, the final result was a net loss of 0.6% of net sales. After crediting back interest on owned capital and other items of additional revenue, the final net gain was 1.6% of net sales. Turnover of stock was at the rate of 3.7 times for the year. The total volume of sales, represented by the 85 wholesalers, was approximately $65,000,000. It was found that when the firms were classified according to population of the cities in which they were located, those in cities with a population above one million made the poorest showing as regards net profit. Eighteen of the companies had losses in 1927, amounting in each instance to over 4% of sales.



One of the Early Cast-Iron Sectional Radiators

Types That Have Gone Before and Their Influence on the Problem of Radiator Selection

Leading Up to Concealed Radiation

NOW recognized as a distinct and specialized product under the classification of radiators, the concealed, or invisible, radiator may be defined as a heat-transfer unit, usually fabricated from copper or brass, sold encased in a properly designed metal casing, ready for installation behind the wall line or in a similarly suitable location. It is not a conventional type of ferrous radiation, set behind a shield or beneath a cover.

The Origin of the Concealed Radiator

Radiators falling under this classification, have two sources of origin—the automobile radiator, and the unit ventilator. The motor of the automobile requires a cooling radiator of enormous capacity; light weight, compact construction, and enough ruggedness to stand up in automobile service. The automobile is in such general use that the success of the automobile radiator in this field is self-evident.

The other source of the concealed radiator is the unit ventilator. The unit ventilator is to ventilation what the automobile is to transportation. The radiator of the unit ventilator is to its performance about what the motor and radiator, combined, are to the automobile.

What the non-ferrous radiator has meant in the unit ventilator field is indicated by the fact that a unit ventilator with cast-iron radiator, rated to deliver 1200 cu. ft. of air per minute warmed from zero to school-room temperature, weighed 1500 lbs., was 54 in. high, and projected 19 in. from the wall.

The development of the non-ferrous radiator reduced the weight to 300 lbs., the height to 38 in., and the projection from the wall to 14 in. Incidentally, the power cost to deliver this same volume of air was reduced one-half and the cost of the unit ventilator has been reduced almost one-half.

With cast iron, the zero air had to have a 36 in. scrubbing contact for the required temperature rise. Under like conditions, the same temperature rise was secured by the non-ferrous radiator in a contact of 8 in. The peculiar construction of the radiator under discussion, with 95% prime surface, explains the power saving. This construction also has an important bearing upon dust considerations.

Another important consideration was this: When zero air is blown upwards through a light-weight radiator, ice will be formed under certain conditions, as when fires are banked or cleaned or neglected. This condition does not exist when the same zero air is blown downwards upon a mass of cast iron.

The demonstration of such rugged construction as would meet this exacting condition, is the greatest factor in the present wide-spread use of the concealed radiator as a manufactured product as distinguished from the 75-year-old practice of concealing radiators or heating surfaces.

The Sheet-Iron Radiator

Probably the first attempt at what is now recognized as a direct radiator other than pipe coils, was the sheet-iron radiator of the mattress type. The size of this radiator, that is, its length and height, was limited only by the size of the iron sheets available.

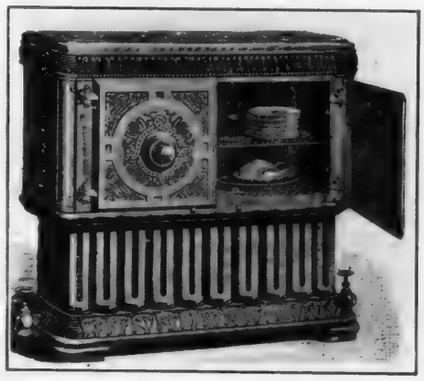
Two sheets of iron were stamped, with cup-like depressions about 4 in. diameter and on approximately 6-in. centers. The cup depressions were intended to space the sheets about ½ in. to ¾ in. They were riveted in the centers, stay-bolt fashion, as in a firebox boiler. The edges were seamed and soldered. The valves were cast-iron bodies, clamped to corners of the sheets. Usually these were on one-pipe steam installations.

These radiators were very efficient and popular. It is said that demand for them among contractors continued long after the present types of cast-iron radiators were available.

Tin Radiators

A later development in the light-weight sheet-metal radiators was that of the Kinnear or pressed-metal radiator type. These were built in sections, and the sections were assembled into complete radiators by nipples, or otherwise, in much the same way as the present type of cast-iron radiator.

Early radiators of this type were made at Marshalltown, Iowa, in the late eighties or early nineties. Some, installed in Kansas residences, have been



Highly Ornate Dining-Room Radiator of the Nineties

in service for over 30 years. The Pressed Metal Radiator Co., Pittsburgh, was the largest manufacturer of this type of radiation.

The Pipe-Tube Radiator

The pipe-tube radiator probably was the successor of the mattress-type sheet-iron radiator.

This consisted of a one-piece casting for a base into which the tubes, mostly 1-in. pipes, about 30 in. long, were screwed in pairs, with right-and-left threads and return bands. These radiators were made in the necessary lengths and multiples of rows to afford the desired heat output. But it required considerable experience to show that the heating effect of a single-row radiator was a much greater quantity, per unit, than the heating effect, per unit, of a multi-row radiator.

Radiators, in 1890, were made by casting manifolds or headers upon 1-in. pipe tubes in the necessary number of rows. These manifolds were machined and sections were assembled as the present-day cast-iron radiator is assembled. This probably was the ancestor of the Corto type of today.

If heating contractors will observe what merchants are doing to create demands for new merchandise in their respective lines, every progressive among them would display a concealed radiator in his showroom. And the contractor who writes into a proposal for concealed radiators: "If cast-iron radiators are used, deduct," will be regarded as the same menace to the industry as one who would cut a dyke that protects lowlands from floods.

Cast-Iron Radiators

Among the earliest cast-iron radiators manufactured in America was the "Bundy," made by the A. A. Griffing Iron Works, Jersey City, N. J., in the early eighties. They were made like the pipe-tube radiators; that is, there was a one-piece base into which cast-iron tubes were screwed. In one type these tubes were divided to make a loop. The whole loop was approximately 3 in. in diameter. The effect was to make each loop a miniature section modeled after the present cast-iron radiator section, with an opening between the two sides of the loop. The other type had rings of fins cast upon the tubes. These fins projected about ½ in. from the tube, and were spaced about ½ in. They made as fine dust collectors as could be designed. These radiators were made in multiples of rows and lengths to afford the desired surfaces, like the pipe-tube radiators.

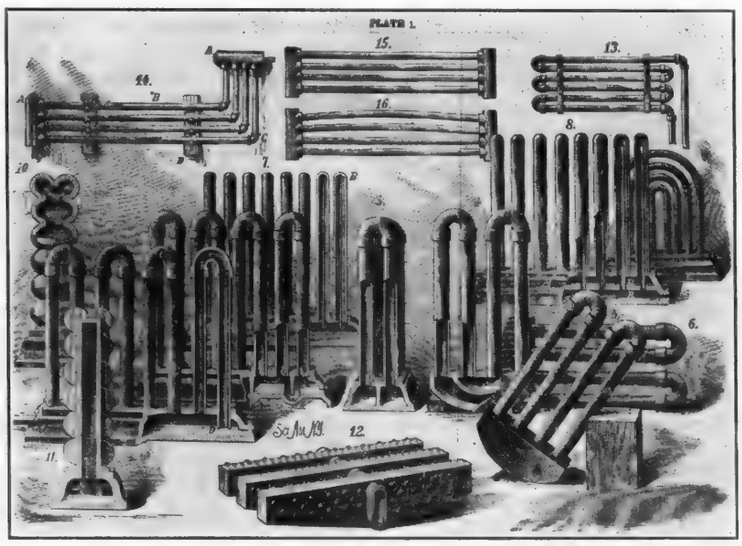
In those days each contractor wrote his own specifications. And the temptation to reduce capacities, in order to secure contracts, was as great as it is today. Knowledge for proper heating diagnosis has advanced to the same extent that it has in medical practice in the same period. Major Pierce often has told of the enormous sales resistance that the present type of cast-iron radiator had to overcome. In the Major's opinion a strike in the radiator industry in New England was the biggest factor in introducing the present type of cast-iron radiator in that section.

Early heating practice in New England residences concealed the radiator by using indirect heating. Often the uncovered boiler was encased in a brick chamber. The additional surface required was the Gold pin indirect radiator massed about the boiler. Heat was piped to registers as in warm-air furnaces. This probably was the real origin of the widespread demand for concealed radiators. In this strike many New England contractors had contracts with time penalties for delayed installation.

The Detroit manufacturers who had sent Major Pierce to Boston, had cast-iron direct radiators stacked like lumber in a well-stocked lumber yard.

Major Pierce related how he moved these stocks into New England so rapidly that the directors of his organization made a trip in a body to ascertain what he was doing with them.

This Non-Ferrous Concealed Radiator Is as Attractive as the Furniture



Courtesy of William J. Baldwin, Jr.

Reproduced from the Classic, "Baldwin on Heating" Showing Radiator Types in Vogue Prior to 1897

Standardization

The consultant who specifies heating necessarily bases his designs upon practice that he has been taught. Therefore he very naturally wants the same standardized data for concealed radiators that has been developed in cast-iron radiator practice of the last 75 years. But he wants something that cannot yet be given to him.

Heat output, with concealed radiators, depends upon thickness of metal, character of metal, relation between prime

An Invisible Radiator Installed in a Sun Porch

and secondary surfaces, arrangement of surfaces as to promote or to retard air flow, and combination of casing and radiator. These are the principal considerations. But there are others.

No two manufacturers can yet agree upon practice in all of these items. And any variation affects heat output. So the consultant's best reliance, in fact, his only safeguard, unless he wants to engage in the business himself, is to rely upon the character, reputation for integrity, and history of accomplishment of the manufacturer whose products are offered to him.

Cast-iron radiator ratings are based upon steam condensing capacity, or equivalent effect with water. Allowances, as much as 30%, must be made where cast-iron radiators are concealed, for decreased heating effect. Such allowances are considered in the concealed radiator manufacturer's ratings, which are based upon heat output.

The ordinary cast-iron radiator is designed for the direct effect within the space to be warmed. Removing it from this space and concealing it, changes the conditions upon which its design was based. Consequently its rating also is changed. The concealed radiator is designed, built, and rated for concealment. But consideration for what all of this means, must be given by those who specify the concealed radiators, manufactured as a unit as compared with past practice in the concealment of the ordinary cast-iron radiator.

Cast-Iron Radiator Designed for Maximum Radiant Heat Utilization

Piping Problems With Concealed Radiators

It is obvious that the concealed radiator unit introduces new problems in the concealment of connections, valves and traps. One advantage of the concealed radiator, properly designed and manufactured, is that heat emission is more easily and perfectly controlled by dampers that govern air flow than by valves that govern the flow of steam, vapor or water. Supply valves are superfluous with such properly designed and manufactured units.

With steam or vapor heating, traps or their equivalent are required. And as such apparatus requires more or less maintenance, accessibility is essential. Air circulation over the trap bodies also is an essential consideration. With hot water warming, venting provision must be made. Concealed radiator units introduce an entirely new set of considerations for the designer.

Dust

The menace of dust in heating and ventilation never has been adequately appreciated. Dust is the greatest menace to health that we have.

Konrad Meier, in one of his admirable papers, directs attention to certain German research as to the effect of dust on heating surfaces. This research showed that temperature exceeding 150° carbonized excessive quantities of the atmospheric dust that all air carries. Ammonia was one of the discovered products of this carbonization.

Certain German hospital authorities refuse to permit anything but hot water warming as a result of this research.

Diffusion or Heating Effect

It has been demonstrated that heating effect, a greater consideration than condensation, can be secured with a properly designed and applied concealed radiator unit. There are too few data available yet, to ascertain why this is so. But what are available seem to indicate that warmer floors and cooler ceilings result from proper application of concealed radiators. Consequently heating costs are lowered to this extent by their use.

All of these considerations deserve attention from designers when they specify concealed radiators.

Heating and Ventilating Equipment to Be Prominent in New York Power Show

At the present writing, the exhibitors at the Seventh National Exposition of Power and Mechanical Engineering to be held at the Grand Central Palace, New York, December 3-8, 1928, include a large number of manufacturers of heating and ventilating equipment. Among these are:

	Exhibits
Boilers	12
Furnaces	15
Grates and stokers	14
Radiators	10
Blowers	20
Air conditioners	5
Air filters	6
Gaskets and packing	9
Separators	9
Cooling towers	4

In the power field there is a large number of exhibits which will be of interest to those engaged in heating and ventilating work. These include:

	Exhibits
Pipe and piping	18
Steam specialties	24
Oil-burning equipment	6
Stokers and grates	14
Valves and fittings	49
Pumps	10
Engines and turbines	19
Coal companies	3
Pulverized coal equipment	10
Boilers	12
Feed water heaters	8
Feed water softeners	5
Fire, brick, arches	20

There also are 64 exhibits classified as tools, 90 classified as transmission equipment, and 14 miscellaneous exhibits.

At the show, last year, when heating and ventilating exhibits dominated the display, there were 100,000 visitors to view the latest developments in mechanical equipment.

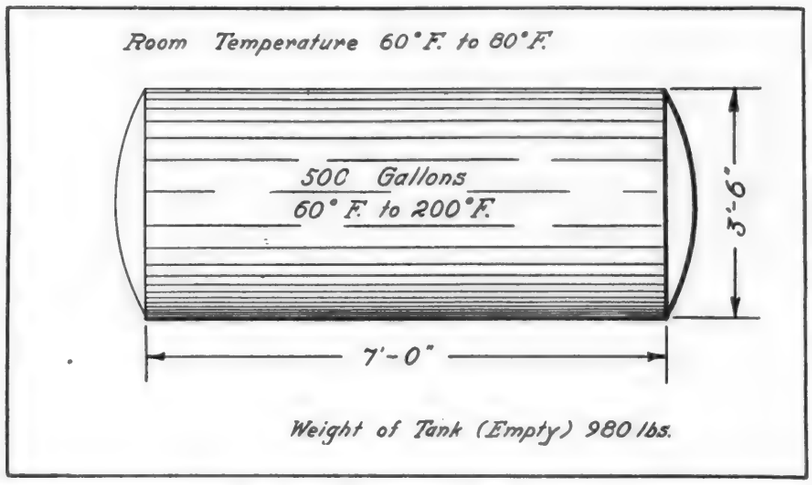
Lectures Published on Heating, Ventilating and Plumbing

Bulletin No. 20, Series 23, of the Carnegie Institute of Technology, Pittsburgh, Pa., recently issued by the department of industrial relations, contains the five lectures delivered before the fourth annual three-day institute, held under the direction of the department of plumbing, heating and ventilating. Estimating was the subject of a lecture by Prof. S. E. Dibble in which special attention was paid to the correct method of figuring overhead, based on the selling price, and not on the material and labor costs. Water heating was taken up by Prof. A. H. Blaisdell. The other lectures included such subjects as business methods, accounting, codes and ethics. Size 6 in. x 9 in. Pp. 64. Price $1.

How Would You Do It?

Question No. 13

Will it require more or less steam at 2 lbs. gauge to heat 500 gal. of water, in a steel tank without covering, in one hour than in three hours? Assume the water temperature rises from 60° F. to 200° F. during the heating period; that the tank is 42 in. diameter x 7 ft. long, weighs 980 lbs. and that the room temperature rises from 60° F. to 80° F. owing to the radiation from the tank during the heating-up period.



Problem Presented in Question 13

FIRST will be determined the number of B.T.U. required to heat the water through the temperature range specified. This will be the number of gallons multiplied by 8-1/3 lbs. multiplied by the temperature rise which is from 60° F. to 200° F. or 140° F., thus:

$$500 \times 8.33 \times 140 = 58{,}333 \text{ B.T.U.}$$

But, the tank itself also must be heated and we must multiply the weight of the tank by the temperature rise (which would give the B.T.U. if the tank consisted of water instead of steel) and then multiply this by the specific heat of steel which is 0.12. This gives:

$$980 \times 140 \times 0.12 = 16{,}464 \text{ B.T.U.}$$

Then we must determine the radiation from the tank during the heating-up process, which, the problem states, was sufficient to raise the room temperature from 60° F. to 80° F. during the time the tank was heating. It is evident that any heat dissipated into the room from the tank had to be replaced by the condensing of an additional amount of steam in the tank coil, and this loss may be approximated by figuring the amount of surface on the tank and computing the heat radiated from that surface during the heating-up period.

The tank is 42 in. in diameter so that the circumference is

$3.5 \text{ ft.} \times 3.14 = 10.99$ or, say, 11 ft.

and the area of the shell will be

$11 \text{ ft.} \times 7 \text{ ft.} = 77 \text{ sq. ft.}$

while the area of the two heads will be the area of a 3½ ft. circle plus about 10% for bulging or

$(3\frac{1}{2} \text{ ft.})^2 \times .7854 \times 2 \text{ heads} \times 1.10 = 21.16 \text{ sq. ft.}$

Then the total outside surface of the tank is

77 sq. ft. on shell
21.16 sq. ft. on heads

98.16 sq. ft. total or, say, 98 sq. ft.

To obtain the B.T.U. loss per degree difference, per sq. ft. of tank area, we can take as a basis the average radiator filled with steam at 2 lbs. gauge and having a temperature of 220° F. This will give off 240 B.T.U. when standing in still air at 70° F. So we get a co-efficient of

$240 \div (220\text{-}70)$

or

$240 \div 150 = 1.6$ B.T.U. per degree F. per sq. ft.

Assuming that this co-efficient also is approximately correct for an uncovered steel tank it is necessary only to know the area of the tank shell and the temperature difference between the tank and the surrounding air. In this case the temperature difference does not remain constant as the surrounding air varies from 60° F. to 80° F., and the tank temperature from 60° F. to 200° F. It is possible to approximate this loss by working out the average temperature of the tank and the average temperature of the air and subtracting to find the *average* temperature difference, thus:

Average temperature of tank

$$60° \text{ F.} + \frac{200° - 60°}{2} = 130° \text{ F.}$$

Average temperature of the air

$$60° \text{ F.} + \frac{80° - 60°}{2} = 70° \text{ F.}$$

Average temperature difference...60° F.

Then for this average difference the radiation from the tank will approximate:

98 sq. ft. × 1.6 B.T.U. × 60° Av. diff. × 1 = 9408 B.T.U.

The total B.T.U. now can be calculated as follows:

	B.T.U.
Heating water	58,333
Heating steel tank	16,464
Radiation loss in 1 hour	9,408
Total	84,205

and if 1000 B.T.U. is obtained from each pound of steam condensed in the coil, the pounds of steam required would be

$$\frac{84{,}205}{1000} = 84.2 \text{ lbs. of steam.}$$

This is for a one-hour heating up period; but what happens when three hours are allowed for heating the tank?

In the three-hour period the water will be raised through the same temperature difference and the B.T.U. required will be exactly the same as in the first case. The tank steel also will be raised through the same range so there, too, the B.T.U. required will not be altered. But when the radiation from the tank is considered we must remember that it extends over a 3-hour period.

The average temperature difference between the temperature of the tank and the temperature of the surrounding air is not changed because the tank is heated—during the 3-hour period—up to the same temperature as was previously attained at the end of the one-hour period, and the temperature of the surrounding air also begins at 60° F. and reaches 80° F. at the end of 3 hours.

Then the *average* temperature difference is unchanged but the *time element is changed*, and the radiation loss from the tank becomes:

98 sq. ft. × 1.6 B.T.U. × 60° av. temp. diff. × 3 = 28,224 B.T.U.

So that, if 1000 B.T.U. is received from each pound of steam condensed the

number of pounds required will be:

	B.T.U.
Heating water	58,333
Heating steel in tank	16,464
Radiation loss in 3 hours	28,224
Total B.T.U. required	103,021

or 103,021 ÷ 1000 = 103.02 lbs. steam.

As the 1-hour heating period required only 84.2 lbs. of steam, it will be seen that the 3-hour period will require an additional amount of steam of

103.2 lbs. — 84.2 lbs. = 19 lbs. of steam.

This must not be confused with the average hourly rate of steam which, in the first case, would be 84.2 lbs. per hour, but in the second case would be

103.2 lbs. ÷ 3 = 34.4 lbs. per hour, average rate.

Problem for Next Month

Question No. 14

A factory situated in a northern city has a steam heating system designed for weather at —10° with 70° inside. There is 3200 sq. ft. of radiation in the building with an additional piping load of 20%. The heating plant is operated for 16 hrs. a day, 7 days a week; the fuel used is bituminous coal with a heating value of 12,800 B.T.U. per lb. Assuming a standby loss of 15%, and that performance charts are available for the boiler used, together with degree-day data, how much fuel will be used in a normal heating season of 6450 degree-days?

	Degree Days	Average Outside Temperature Deg.
October	434	51.
November	789	38.7
December	1137	28.3
January	1296	23.2
February	1086	26.2
March	905	35.8
April	537	47.1
May	266	56.5
	6450	

The performance curve for this boiler shows the following efficiencies at the outputs specified:

Sq. Ft.	Efficiency Per cent
500	42
1000	52
2000	60
3000	65
4000	72
5000	63

Architects Condemn Free Engineering Service

A resolution, disapproving the practice of furnishing free drawings and specifications to architects by manufacturers and their representatives, was adopted by the Chicago chapter of the American Institute of Architects recently. The resolution, which was transmitted to the members of the institute, reads as follows:

"Whereas, It has come to the attention of the Chicago Chapter, A.I.A., that certain branches of the building industry are offering to furnish complete engineering service free, including drawings and specifications, as an inducement to the sale of their commodity to prospective customers, thus eliminating free and unrestricted competition, resulting in greater building costs, and tending to limit the full functioning of the architect as professional advisor to the Owner in connection with all departments of building, and

"Whereas, This practice if continued and followed out to its ultimate conclusion in all branches of the building industry would greatly restrict if not eliminate the architect and independent engineer in the performance of proper functions,

"Therefore be it resolved, That the Chicago Chapter, A. I. A., disapproves of the practice of furnishing and acceptance of free drawings and engineering service whether furnished to architects or to owner, and that a copy of this resolution be sent to all Chapters with the request that they express their disapproval in all cases of this nature which may come to their attention, and take such action as they may see fit toward discouraging the practice, also that copies be sent to all of the offending parties, as information regarding such practice by them may come to the attention of the chapter secretary.

Comparative Tests of Canadian Solid Fuels in a Domestic Heating Boiler

That the round cast-iron boiler commonly used for heating purposes in this country is not suited for burning Canadian fuels is clearly demonstrated in a report of tests made by the Canadian Department of Mines at its fuel testing station in co-operation with the Dominion Fuel Board. In these tests, in which 21 types of coal and coke were fired, a comparison of the results obtained with the different fuels shows that, Alberta semi-bituminous excepted, from 25% to 65% more Canadian coal was required to secure the same effect as American anthracite. American anthracite, by-product coke and various grades of American and Alberta sub- and semi-bituminous coals were tested.

From 40 to 120-hour tests were run on a 25-in. round boiler, to which was connected a system of wall radiators immersed in a tank of cooling water. Knowing the quantity and rise in temperature of the water, the useful work done was calculated. Three rates of combustion were maintained to give outputs of 66,000, 99,000, and 132,000 B.T.U. per hour for each of the 21 types of fuel tested.

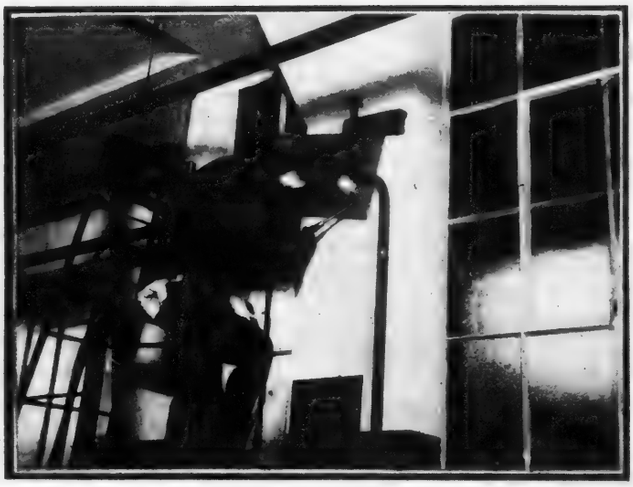
Fuel fired per therm (100,000 B.T.U.) delivered to the cooling water, was characterized by the authors as the most important item in the tabulated results as it is a measure of the pounds of fuel required per unit of useful heat delivered. Inasmuch as coal is purchased by weight, and not by its heating value per pound, the fuel fired per therm delivered does seem to be of more practical value than the thermal efficiency.

On this basis of comparison—pounds of fuel fired per therm delivered—the results were as follows: American anthracite, 10.50 to 12.38; Welsh anthracite, 9.35 to 10.40; Scotch semi-anthracite, 9.44 to 10.24; gas-coke, 10.82 to 12.12; by-product cokes, 9.90 to 12.22; American smokeless semi-bituminous No. 1, 10.72 to 12.75; American smokeless semi-bituminous No. 2, 10.55 to 11.25; Alberta semi-bituminous, 10.75 to 12.59; Alberta sub-bituminous No. 1, 13.85 to 15.27; Alberta sub-bituminous No. 2, 14.35 to 16.16; Alberta sub-bituminous No. 3, 14.46 to 16.98; Alberta domestic No. 1, 16.03 to 18.25; Alberta domestic No. 2, 16.34 to 18.78; Alberta domestic No. 3, 16.41 to 18.64; Alberta domestic No. 4, 16.53 to 18.73; Alberta domestic No. 5, 18.07 to 21.65; air-dried peat, 25.00 to 29.43; Welsh briquettes, 12.18.

Plotting overall thermal efficiency against volatile matter in the coal, the investigators show that the points arrange themselves in four distinct groups, one for cokes (lowest volatile) and the rest in the following order; anthracite, semi-bituminous coals, high volatile Alberta coals. The relationship of the points derived leads to the conclusion that, in a general way, the boiler was better suited for burning anthracite than for burning coke, and also—a matter of interest to Canadians—that this type of boiler is unsuitable for burning Alberta fuels. The range of efficiency with Alberta fuels was from 57½% to 67%; with anthracite 67% to 77%.

The report concludes with a comparison of all the fuels tested with 10 tons of American anthracite, based on the quantity of fuel fired to deliver a therm to the cooling water. In this comparison it is shown that Welsh anthracite is the most economical fuel, 8.39 ton to 10 ton of American anthracite, while the Alberta fuels—excepting Alberta semi-bituminous—require 12.96 to 16.73 tons to equal 10 tons of American anthracite.

The report appears under the authorship of E. S. Malloch and C. E. Baltzer, and is issued as Bulletin No. 671-2 of the Department of Mines, Ottawa, Ontario, Canada.



Welder at Work, with Asbestos Sheet Protecting the Wall

Welding in Heating

(At top) Large Pipe Marked with Prick-Punch for Cutting

(At bottom) Following the Line of Prick-Punch Marks with a Cutting Flame

Opening Cut in Manifold Pipe Ready for Application of Leader

Working in Close Quarters Is Not as Difficult as It May Seem

Industrial Installations

An All-Welded Expansion Loop

Examples of Comparatively Intricate All-Welded Piping Installation

Correspondence

How to Connect a One-Pipe System and a Vacuum-Return System so that Each Will Operate under Vacuum Conditions.

EDITOR HEATING AND VENTILATING MAGAZINE:

Is it practical to connect a gravity one-pipe heating system to a two-pipe heating system having vacuum return pumps? Possibly you can suggest some good inexpensive arrangement whereby I can do this in the case of two existing heating systems and get a good circulation in both systems without interfering one with another. Each system has its own boiler, one of which will be discontinued and the other increased in size.

Please advise if I can run these systems from one boiler without changing the gravity one-pipe system to a two-pipe vacuum return system.

New York, N. Y. HENRY HUNTER

The accompanying sketch shows a solution of this interesting problem. In Building No. 1 each radiator of the one-pipe system has been fitted with one way air valves, that is, air valves which will allow the venting of air from the radiators, but which will not permit of its return. If air were allowed to enter the one-pipe system it soon would work back through the steam main to the new boiler, destroying the vacuum which is produced in this boiler at certain times.

A large quick-venting one-way type of air valve is shown on the end of the steam main before it drops wet as at "A." This can be omitted if the main is extended and connected at "D" through a thermostatic trap. The water line at "A" traps the steam and prevents its passage in the same manner as the trap at "D," but the water line at "A" also traps the air, whereas the trap at "D" allows the pump to pull on the main and remove the air to get a better circulation on the one-pipe system.

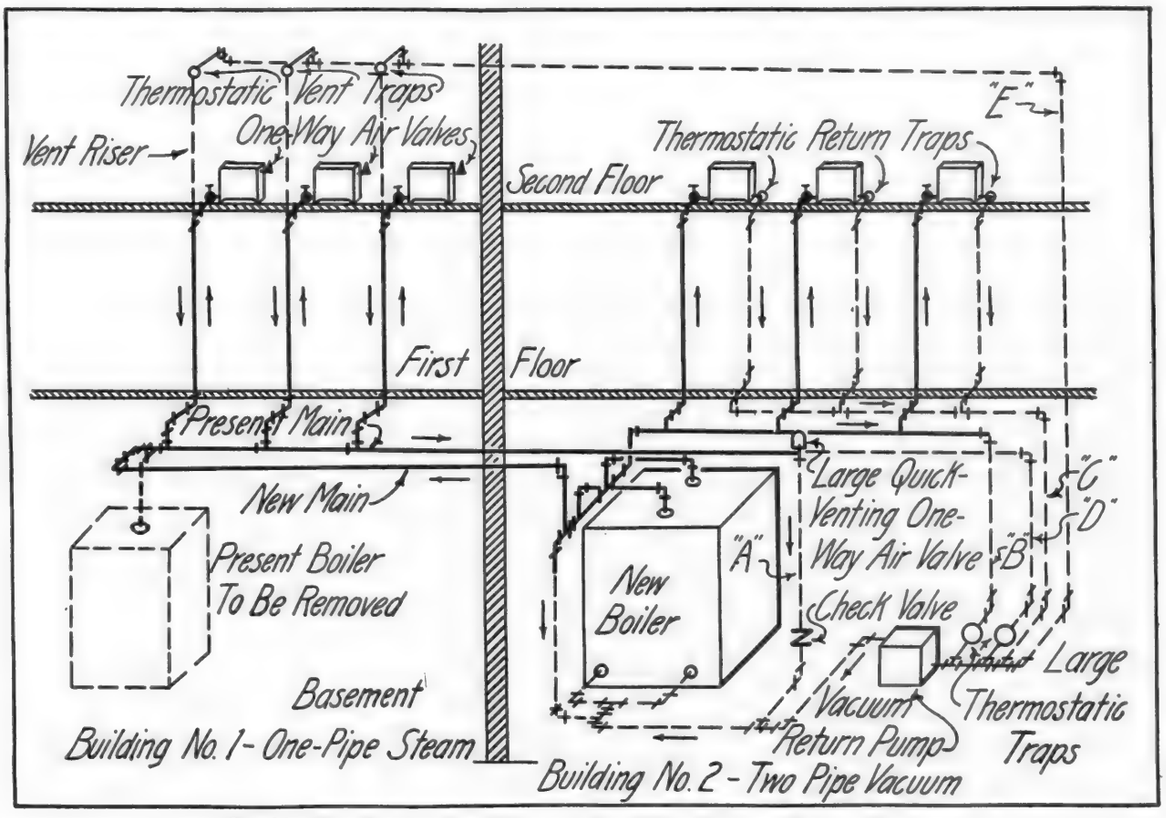
The venting of the one-pipe risers through thermostatic traps and air line "E" is a further suggestion for increasing the circulation in the one-pipe system, but the slight advantage obtained by means of this arrangement would hardly be worth while if the system is large and the physical conditions interfere to any extent. At its best it will not vent the radiators as is done in the case of Building No. 2 where the return risers pull on the return end of the radiators.

No large thermostatic traps are required at the pump on "C" and "E" as these lines already have been trapped by the small thermostatic traps at the radiators. The check valve in "A" prevents the pump from discharging upward through "A." The advisability of avoiding such an arrangement is an additional reason for using method "D" instead of "A."

An Electrical Analogy of Static Pressure

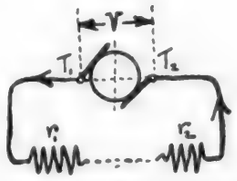
EDITOR HEATING AND VENTILATING MAGAZINE:

Twice I have read "What is Static Pressure" in THE HEATING AND VENTILATING MAGAZINE for December, 1927. Not being a ventilating engineer, I still am wondering just what static pressure is. The article states that static pressure is, for a fan, exactly what voltage is for a generator. Does this mean that static pressure, or the ability to form static pressure, is built up in the pressure



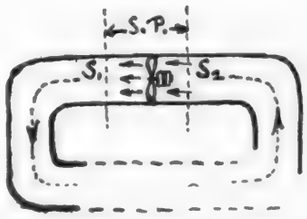
Combination Gravity One-Pipe and Two-Pipe Vacuum Return System

Fig. 1



Case of the Electric Generator

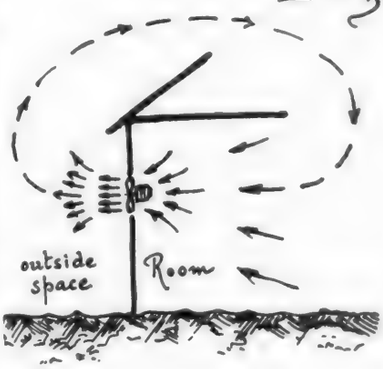
T_1 and T_2 are the terminals, r_1 and r_2 the resistances the generator has to overcome. The voltage V of the generator is the difference of the potentials at its terminals T_1 and T_2. It is this voltage that permits the resistance of the electric circuit to be overcome.



Case of a Fan in a Duct

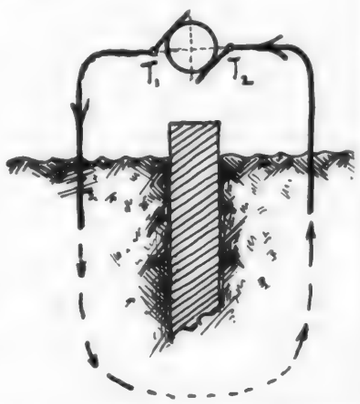
The duct is the conductor of the air current in the same way that wires are conductors of the electric current. To circulate air in ducts, a resistance has to be overcome. The static pressure (S.P.) is the difference of pressures between the two sections S_1 and S_2 which permits the resistance of the duct to be overcome.

Fig. 2



Case of a Fan in a Window

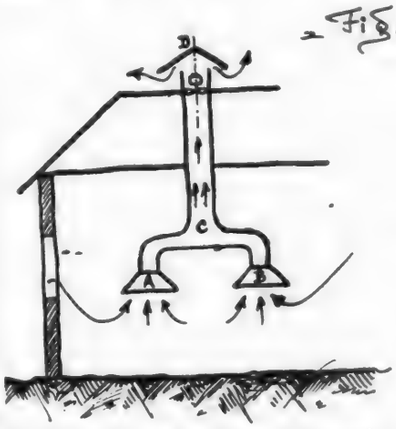
The fan is exhausting air from the room into the outside space, and fresh air is getting into the room through the other openings. The air circuit closes in some way, through the atmosphere, as indicated by the dotted line. A certain resistance has to be overcome to establish such air circulation. Thus even a fan installed in a window must furnish some static pressure. When a wind is blowing against the window this static pressure may become a very important matter.



Electrical Analogy of Fan in Window

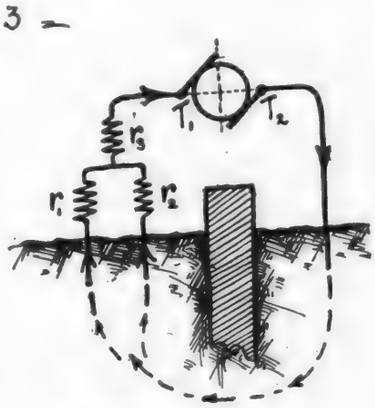
A generator has both its terminals grounded, but in the ground there is an isolated layer, such as a brick wall. The current circulates along some circuit as indicated by the dotted line. There would not be much practical usé of connecting an electric generator in this way to the ground, but with air it is different. The point is that, in the case of air, we exhaust one kind of air (foul) and let in another kind (fresh). This is what we call ventilation.

Fig. 3



Fan Drawing Air from Room Through Hoods, Discharging it Outside

This sketch is self explanatory. The duct resistances between AC and BC are r_1 and r_2. The resistance of the duct CD is r_3. The air from the inlets into the room, flows into the hoods and is discharged into the free atmosphere above the roof. The fan must be able to develop the necessary static pressure to overcome the resistance of the air circuit involved.



Electrical Analogy of Case

The electrical resistance r_3 in series with resistances r_1 and r_2 (which are in parallel) corresponds to the duct resistance of the parallel case. The grounding of r_1 and r_2 corresponds to the flow of air into the hoods A and B from the free atmosphere. The grounding of the terminal T_2 corresponds to the air discharge into the free atmosphere.

created by the volume and velocity of air being discharged?

Is static pressure measured at the fan itself or is it measured in the air duct at a given distance from the fan? Is it possible to have different static pressures along an air duct? For ventilating service, is an exhaust fan more efficient than a blower fan where it is necessary to move air at a velocity of 2000 ft. per minute, as well as to displace air in a room for normal ventilating purposes?

New York. H. S. D.

When we are dealing with an electric generator, what is called its voltage is the difference of potential between its terminals. Thus, in case of a fan operating inside a duct, it is the duct that fulfills the function of wires conducting the electric current (see Fig. 1). The case of a fan operating between two open spaces—such as a fan installed in a window and exhausting air from a room into the outside space—is similar, say, to a grounded generator as illustrated in Fig. 2. A more general case is explained by Fig. 3. Now, whichever way a fan is operating, the air gets into the fan from one side of it and leaves it from the other, just as the electric current gets out of the generator by one terminal and returns to it by the other. (I have here in mind a D.C. generator, of course.) The static pressure given by a fan is the *difference of pressure* in front and behind, just as the "voltage" of a generator is the *difference* in potential between its terminals. The air, in passing through a fan, has its pressure increased (the air is slightly compressed). For the actual measurement of static pressure, I only can refer to the standard methods used for this purpose. Also I must state that the measurement of the performance of fans is a very difficult engineering problem and even most of the standard methods are accurate only to an approximation of 10% to 20%. Fan engineering lately has become quite a scientific branch of engineering and the new test methods developed permit of greater accuracy. It would require too many explanations to discuss this matter here.

For larger volumes at moderate pressures I believe that disc fans are more practical than blowers. They have higher efficiencies, occupy less space, and are less expensive. Such a thing as free delivery is a pure abstraction never met in practice. *Some* resistance to the circulation of the air always has to be overcome, such as outside winds, different hindrances to the circulation of the air, etc. Thus, only a fan giving a positive static pressure will secure a reliable ventilation.

New York. G. DeB.

Proper Location of the Air Valve Venting Mains

EDITOR HEATING AND VENTILATING MAGAZINE:

Practice seems to vary as to the placing of vent valves on mains. In some cases I have seen these valves located at "B" as shown in the accompanying sketch and, in other cases, I have seen them used at "A," yet with equal results so far as I could learn. Will you kindly give your opinion on this matter?

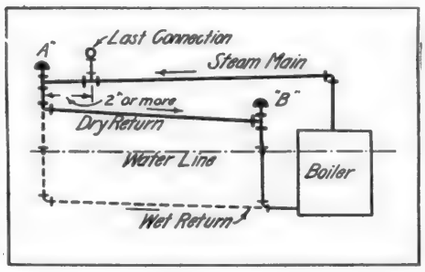
Cleveland, Ohio F. R. E.

In theory a vent valve should be placed at the point where the air is trapped or pocketed, that is, at the end of the dry return where it drops to below the water line, for example, at "B" if a dry return is used, or at "A" if the return is wet as shown by the dotted lines. The latter is done in order to give greater surety of freeing the piping system of air. However, the amount of air in the pipe between "A" and "B" is small at most and it can work out backwards when displaced by water and flow out through vent "A" or even through the radiator air-valves if no valve is used at "A."

In some heating systems the vent valves are not readily accessible when located at the end of the steam main, as at "A," and in such cases it would be better to install them at "B," close to the boiler, where they are visible and convenient and therefore more likely to be given proper attention. However, generally speaking, location "A" is preferable because the vent valve is set at a higher elevation and therefore is not so likely to flooding by water backing up from the boiler. Furthermore, the absence of steam in the section of pipe from "A" to "B" tends to eliminate water hammer which would occur should water back up in the dry return; makes unnecessary the use of pipe covering between these points; saves the heat otherwise lost where not wanted, and makes possible a smaller size of return pipe. Thus, the pipe "A" to "B" need be sized but slightly larger than a wet return because there is no steam flowing in it to replace the steam lost by condensation within the pipe.

Of course, a job will work with the vent in either location, or for that matter without a vent valve at either "A" or "B"; in fact, even where installed, they are likely to be neglected and cease to function after a time. There is more air in the radiators than in the mains and this will have to be eliminated in any event. In the aggregate the ports of radiator valves are not much less in area than the large quick-venting valves on the mains.

The advantage of the large quick-venting main valves is their ability to operate



Alternative Method of Venting Mains

at low pressures, so that steam flows first to the end of the mains, after which it flows into the radiators at a uniform rate. As a consequence, radiators distant from the boiler will receive their supply of steam as quickly as those close to the boiler. Where they are not used, the air in the mains must be forced out through the radiator air valves. In this event, shutting off of the radiators served by the end of the main prevents air from leaving the main at its end. When the radiators are turned on again it will take a little time before the air in the mains is relieved through the radiator air-valves, hence such radiators will be rather slow in warming up.

Colors in Household Equipment May Prove Boomerang

Recent extravagant tendencies toward the use of color in home equipment, such as bathroom fixtures, kitchenware, boiler-jackets, and other hitherto plain lines, are causing wholesalers to complain, due to the increased stocks they must carry to keep the necessary patterns in the available colors advertised, according to Ray M. Hudson, assistant director in charge of the commercial standards group, of the Bureau of Standards, in his quarterly report. Mr. Hudson, in this report, said:

"Individual consumers are becoming better acquainted with the wastes of over-diversification and the invisible tax they pay in their purchases because of this over-diversification. Inquiries from them to the department also are increasing. A further indication is found in the reaction already developing in some quarters to recent and current trends toward excessive diversification. The advent of color into many hitherto plain lines, ranging from kitchenware to bathroom supplies, has caused jobbers of these articles to protest the effect produced on their own inventories by this stock multiplication."

The commercial standards group of the Bureau of Standards also embodies the Division of Simplified Practice, which, in co-operation with industries, has completed a total of 95 simplifications.

Standards for Cast-Iron and Malleable Pipe Fittings Approved

For the past seven years sub-committees of the American Engineering Standards Committee have been studying the problem of unifying the specifications for flanged and screwed fittings used in this country. Standards for all sizes of cast-iron pipe flanges and flanged fittings for maximum working saturated steam pressure of 125 lb. per sq. in., now have been approved by the standards committee, and by the three sponsor organizations, namely, the Heating and Piping Contractors National Association, Manufacturers' Standardization Society of Valve and Fittings Industry, and the American Society of Mechanical Engineers. Also there have been approved standards for cast-iron screwed fittings, for maximum working saturated steam pressure of 125 lbs. and 250 lbs. per sq. in., and standards for malleable iron screwed fittings for maximum working pressure of 150 lbs. per sq. in. Dimensions and theoretical weights of these fittings are presented in full in bulletins A.E.S.C.—B16a—1928, of the standards committee, whose address is 29 West 39th St., New York. Size 8 in. x 10½ in. Pp. 20. Price 50 cents.

Smallwood and Kouwenhoven on Applied Mechanics

"Mechanics for Engineers" is the title of a volume by Julian C. Smallwood and Frank W. Kouwenhoven, both members of the faculty of Johns Hopkins University. Definitions and general principles are presented in the first chapter, with only enough of the former to cover the material following. The study of uniform rotation precedes the chapter on the center of gravity and non-parallel coplanar forces, followed by an easily understood chapter on framework, cranes and trusses. It is in this work that the beginner in mechanics usually finds trouble, so that the pains the authors appear to have taken with this part will not be amiss.

Throughout the book problems are given, with answers, usually based on such phases of engineering as will interest the student. This is particularly true in the chapters on rectilinear acceleration, the problems in the main dealing with motor cars, which will appeal to almost every reader.

Size 6 in. x 9 in. Pp. 185. Price $2.50. Published by D. Van Nostrand Co., Inc., 8 Warren St., New York, or may be had through the book department, THE HEATING AND VENTILATING MAGAZINE.

New Ventilation Tests to Be Made in New York Schools

At its regular meeting on August 8, the Board of Education of the City of New York approved the proposal of the New York Commission on Ventilation to conduct a study of the effects of ventilation on the health of the pupils in four schools in the Bellevue-Yorkville district of the Borough of Manhattan.

This district was selected for study because of the particular interest that has been taken to improve the health of the residents of this community by the Milbank Memorial Fund, which always has financed the work of the commission and which now is collaborating with the official and voluntary health and welfare agencies operating in that area in a health demonstration.

Investigation showed that there was but one school for normal pupils (Public School 116) in the district employing the unit type of ventilation now currently installed in the newer schools of the city. In the four or five schools in which central fan systems had been installed, these plants had not been operated for ten years or more.

On the receipt of this information the commission felt it was useless to attempt a study of the comparative effects of the central fan system of ventilation with other types. It was the opinion of the members that probably the most important phases of the subject to be studied at this time were: (1) the effect of normal (30 cu. ft. of air per minute per child) and reduced rates of air change (10 to 15 cu. ft. of air per minute), and (2) the effects of the unit system versus the window-gravity method which the commission earlier concluded to be more conducive to the health of the pupils than the central fan system then generally used.

In conformity with these ideas, the following plan is proposed:

Alternate rooms with the same exposure and occupied by pupils of the same year (having approximately equal distribution by age, sex and race stocks) will be ventilated by different methods as described above.

The relative incidence of respiratory illness among the pupils will be taken as the criterion for judging the success of the method of ventilation. The occurrence of respiratory illness will be determined by nurses, appointed by and acting under the direction of the city department of health. The health commissioner and the bureau chiefs concerned have promised this co-operation. The nurses will visit the classrooms each day during the study to determine the cases of respiratory illness among the pupils present. On the occasion of the visit to the classroom the nurse will secure from the teacher a list of the absentees and she will investigate each absence by home visit or otherwise to determine the cause, in order that the total incidence of respiratory disease among the pupils may be determined.

The air conditions in the classrooms will be determined at frequent intervals (once each week or ten days) by an observer from the commission. This observer will make the following tests:

(1) The rate of air change.
(2) The temperature distribution.
(3) The relative humidity.
(4) The velocity of the air currents in different parts of the room.

Automatic recording devices, supplied by the commission, will make continuous records of the wet and dry-bulb temperatures in one room and of the dry-bulb temperatures in another room of each school.

The temperatures as indicated by thermometers in each classroom will be recorded at frequent intervals throughout the day by the teacher or, in the older classes, by pupils under the teacher's supervision. This record for each classroom is desired in view of the apparent relationship between overheating and respiratory illness among the pupils.

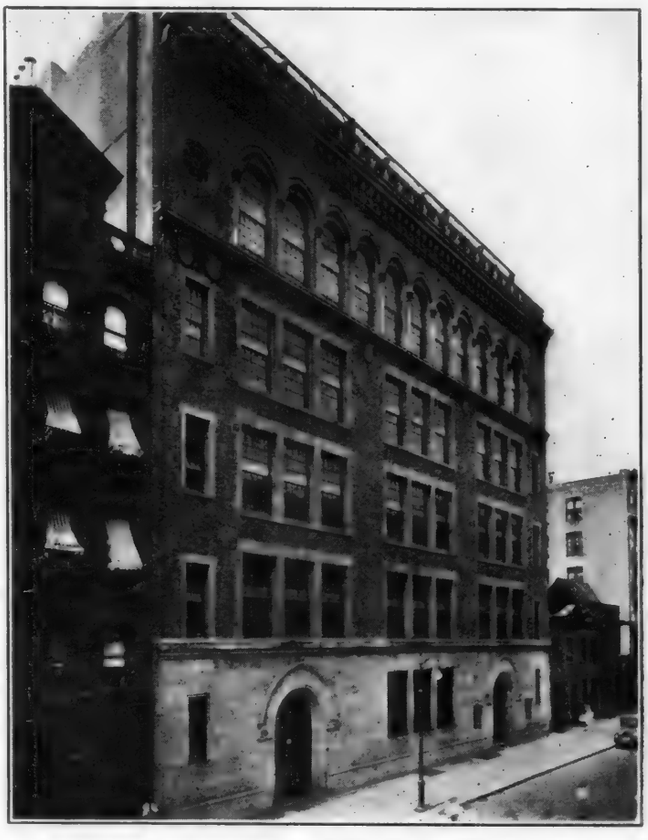
The Schools and Changes Necessary for the Study

For the purposes of this study, it is proposed to select four schools, two of them to be:

Public School 116, East 33rd Street
Public School 104, East 16th Street

In Public School 116, the unit ventilators in alternate rooms, occupied by grades 2A and 6B, inclusive, will be fitted by the manufacturers with rheostats or other form of resistance so they will provide but from 10 to 15 cu. ft. of air per minute per child.

In Public School 104 (in the newer portion of the school fronting on East 17th Street) it is proposed to install unit ventilators in alternate rooms and



Public School 116, New York, in Which Effects of Ventilation Will Be Studied

to adapt the other rooms for window-gravity ventilation as recommended by the previous commission.

It is desired to duplicate these studies, in principle, in another locality to insure against findings that may be due to qualities inherent in the groups selected.

In making arrangements for this study, the commission invited the American Society of Heating and Ventilating Engineers to appoint a committee to collaborate with it in order that the results obtained may be assured of being generally useful. President Willard appointed the following members to serve in this capacity: C. L. Riley, Willis H. Carrier and W. L. Durand.

Another member of the society, Frank G. McCann, chief of the heating and ventilating division of the bureau of plant operation of the board of education, is co-operating with the commission in this study, which has the interest of the health commissioner and of the committee on public health of the New York Academy of Medicine.

Japanese Heating and Plumbing Engineers Hold Convention in Osaka

The Domestic Engineering Society of Japan, an organization of heating, ventilating and sanitary engineers, recently held its annual convention at Osaka, Japan, with 130 members present. Several Japanese authorities addressed the meeting, which was held at the central public hall.

Togoro Suga, president of the firm of T. Suga & Co., Ltd., heating, ventilating and plumbing engineers and contractors, and chairman of the committee of the society in western Japan, addressed the convention as follows:

"All the members in the western district of this country have waited for a long time for this great day, as the general meeting of this society, the most powerful and influential in sanitary engineering circles of this country, has never before been held in a western city. We cannot find words to express our thanks for the fact that so many busy members have come to take part in the meeting from distant places, and for the fact that several sanitary engineers of great authority have come to lecture on important subjects. We hope that the society will take a more powerful and more significant position in the future so as to guide and improve the engineering standards and to unite us all firmly under one bond for the good of all."

Announces Fourth Mid-West Power Conference

The fourth Mid-West Power Conference will be held at Chicago during the week of February 10, 1929, and will be convened every two years thereafter. The conference at Chicago probably will be sponsored by the following engineering societies: American Society of Heating and Ventilating Engineers, American Society of Mechanical Engineers, American Society of Refrigeration Engineers, American Society of Civil Engineers, Western Society of Engineers, National Safety Council, American Institute of Electrical Engineers, and the American Institute of Mining Engineers.

Meetings and plans are now being formulated and representatives are being elected by the interested societies, so that it is hoped a schedule of papers and speakers can be announced in the course of the next few weeks.

Bureau of Mines Issues Analyses of Petroleums of the United States

In order properly to judge a raw material like petroleum, a complete analysis of its properties must be at hand. The viscosity, for instance, of a given sample means little unless it is studied in connection with other properties so that the sample may be classified with a general group or type.

In Bulletin 291 of the Bureau of Mines, "Tabulated Analyses of Representative Crude Petroleums of the United States," the authors have presented data on 319 samples obtained from 19 states. Information is given as to the field, county, township, range and meridian of the point where the sample was taken, as well as the name of the collector, date, formation or zone, and depth. Table 1 takes up the characteristics of the crude samples one by one, showing the color, specific gravity, viscosity, etc. The per cent of distillation, specific gravity and A.P.I. gravity then are given for ten different temperatures at atmospheric pressures followed by the same information for five temperature ranges under the reduced pressure of 40 mm. Under the summary the same three properties are listed as gasoline light ends, total of gasoline and naphtha, kerosene distillate, gas, oil, and several lubricating distillates, together with an analysis of the residuum.

Work was started on the material for this bulletin in 1919, much of it being carried on under the supervision of E. W. Dean, formerly petroleum chemist of the bureau. The authors, N. A. C. Smith and E. C. Lane, have contributed a valuable addition to the papers previously published by the bureau on this subject relating, as it does, to a basic fuel.

Japanese Heating and Ventilating Society Holds Session at Osaka

Glancing Backward

High Lights in the Evolution of Leaders in the Heating and Ventilating Industry

VII—Richardson & Boynton Company

EUROPEAN practice of passing down a business from father to son, frequently through many generations and two or more centuries, seldom finds a counterpart in American industrial activities. Here the tendency is toward mergers of healthy young industries into corporate form, with executives frequently brought in to represent the financial interests.

It is unusual, then, to find an American industrial organization on the verge of celebrating its hundredth anniversary, having had successively as presidents. the founder, his son and his grandson. The story of the Richardson & Boynton Company, then, is a family story, revolving about the Richardson family and having to do with stoves, ranges, warm-air furnaces, steam and water boilers for coal and gas-fired boilers and furnaces.

The originator of the Richardson & Boynton Company, Henry Augustus Richardson, after some years of experience in the stove business, organized his own stove company in West Boylston, Mass., in 1837, and in 1844 he moved to Worcester, Mass.

In 1847, the business having grown considerably, he began a partnership with a Mr. Chilson under the firm name of Chilson, Richardson & Company, continuing that business until the year 1852,

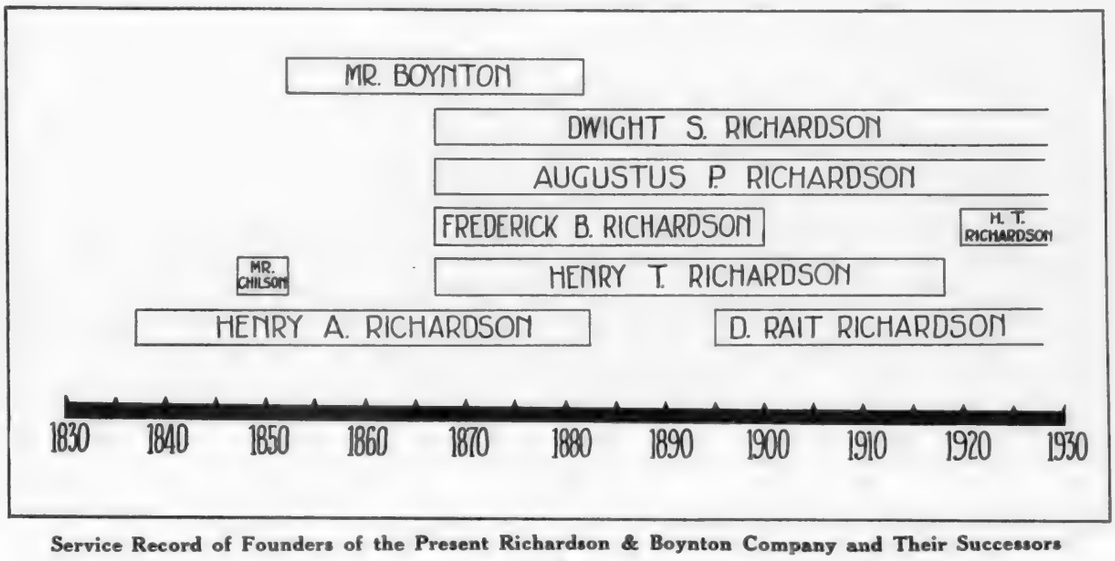
Fifteen Years Ago This Was the Popular Type of Delivery Truck and Every R. & B. Truck Horse Was a Blue-Ribbon Winner

when Richardson, Boynton & Company was organized as a partnership. Manufacturing facilities then were transferred to Spuyten Duyvil, New York, and temporary sales headquarters was established in what now is Herald Square, New York. Finding that this section was too far away from the markets and business section of the city, executive offices were moved to what is now 370 or 374 Broadway, and six years afterwards another move was made to 260 Canal Street.

During this period Richardson, Boynton & Company had developed a warm-air furnace business, and was manufacturing, under patents, the then famous all-cast-iron gas-tight "Perfect" line of furnaces.

It is interesting that in the records of 1915 of the United States Patent Office, mention is made of the fact that the word "Perfect" had been used as a trade name by this company since 1851. During the period of years prior to 1915 there were changes made in the rulings of the patent office in Washington, and, in the latter year, adjectives were declared taboo in registered trade names. "Perfect" was one of a very few adjectives, no longer permitted by the law passed in 1915, that was specifically excepted by the new law, because it had been used by one company for so many years that the authorities believed a hardship would be worked on innocent parties if the ruling on adjectives as a registered mark was not allowed in this and a few other cases. This trade mark, since that time, naturally has been most carefully protected by the present organization, and is looked upon as more than a trade designation.

Shortly after the Civil War there was a reorganization. Mr. Boynton withdrew, and Henry A. Richardson brought into the business his four sons, Henry T., Dwight S., Augustus P., and Frederick B. The headquarters of the company was moved to 234 Water St., New York, and remained there until 1909, when a move was made to 31 West 31st Street. The building on Water Street



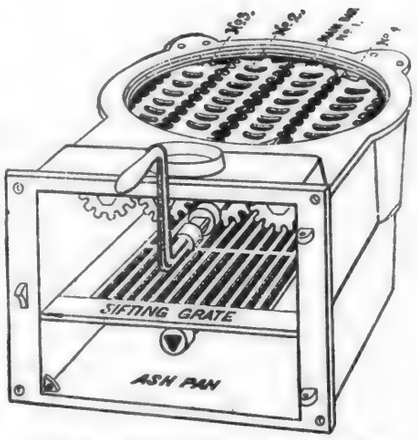
Service Record of Founders of the Present Richardson & Boynton Company and Their Successors

was maintained as a warehouse of the company until 1926—a tenancy of 61 years.

In 1882, the company was incorporated as the Richardson & Boynton Company. Henry T. Richardson, eldest son of Henry A. Richardson was made president, his father retiring. Henry T. Richardson served as president until the fall of 1918, when his son, D. Rait Richardson, took up the executive reins.

About 1865—or shortly after the close of the Civil War—the company started a factory at the lower end of Van Brunt St., Brooklyn, and carried on production operations at that address until 1898, when it moved to one of the present plants, at Dover, N. J.

In the earlier periods of development there had been very wide and striking changes in the construction of stoves, ranges, and furnaces. For some time the company had been manufacturing a water boiler for heating purposes. Compared to present-day design and construction it was crude, at least in appearance, and in attempting to improve on the general idea, the Richardson &



The Triangular Grate Bar First Cataloged in 1885 Strikingly Resembles Those Manufactured Today

Boynton Company brought out its "Perfect" hot-water heater, the rights to which afterwards were sold. The American market at that time apparently was not ready to take up a new fangled idea or method of heating, and great difficulty was experienced in attempting to teach owners of residences how to use this method.

But, in 1896, the company realized the growing demand that was insisting on steam and water boilers, and reentered the field, manufacturing not only round boilers but also the "Richardson" side-feed boiler for steam and hot water.

A Grate Bar Design That Has Survived Nearly Fifty Years

During all these years the Richardson & Boynton Company made consistent improvements, not only in the construction of warm-air heaters but also in the various kinds of grates to better adapt them to economical use with all kinds of fuel, in particular the "Perfect" triangular grate-bar, for which patents were obtained. This grate bar became very popular as was proved by the fact that, as soon as the patent limitation expired, it was generally accepted in the industry.

The portfolios of old catalogs and advertising show many pieces of equipment and methods of application that long since have passed into oblivion. Typical is the combination steam-warm-air—should it be called boiler or furnace?—and the curious piping scheme shown on this page, with separate flow and return to each radiator.

Before the days of the automobile truck, when horse-drawn drays were common, executives of the Richardson & Boynton Company boasted that every truck-horse in the factory stables was a blue-ribbon winner in one of the leading fairs. Hobbies of this kind were common in the industry of that period.

In April, 1917, D. Rait Richardson,

Sectional View of Dwelling as Heated by "PERFECT" Hot Water Heater.
(TRADE MARK)

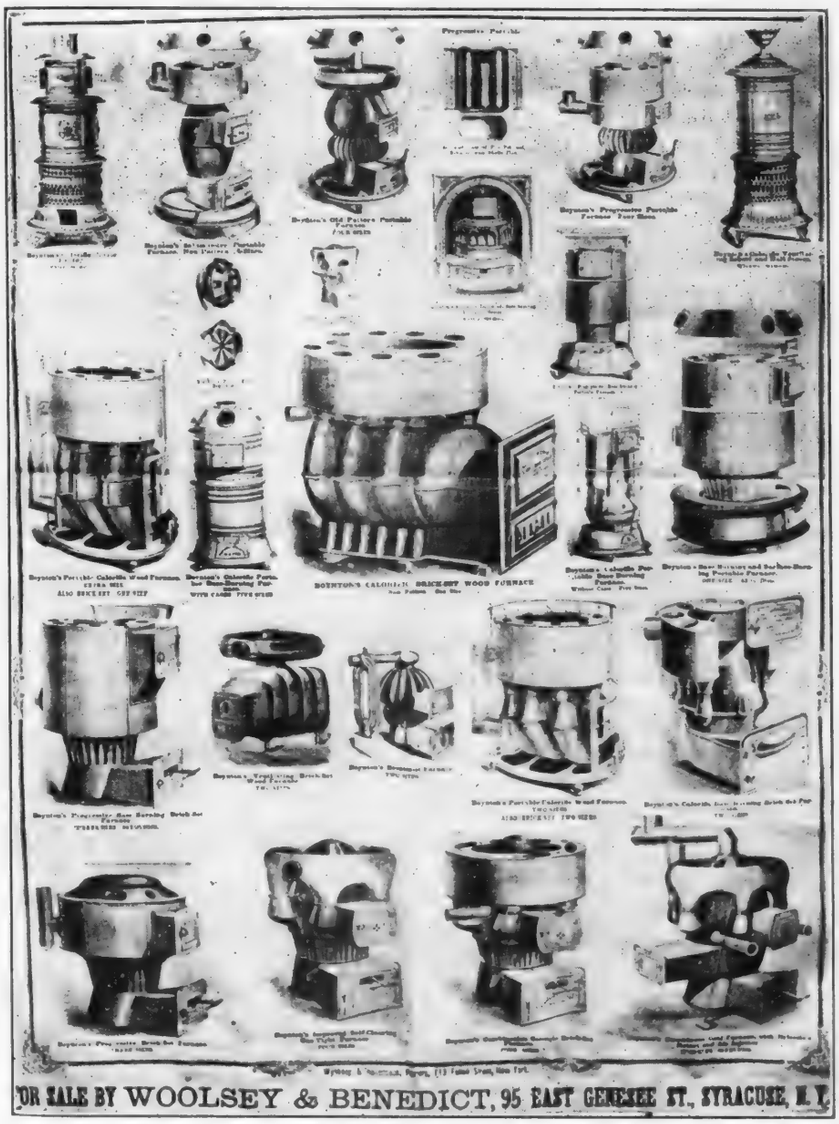
Nearly Half a Century Ago this Advertisement Portrayed the then Modern Heating Equipment as Well as the Home and Social Life of the Day

then an officer of the corporation, was called to Washington with a group of manufacturers to discuss, with the engineers of the government, methods, ways and means of heating cantonments. He resigned from the Richardson & Boynton Company and served in Washington, first in the construction division and afterwards with the priority committee, until the death of Henry T. Richardson forced his return to New York. He again took up his duties as secretary, and in January, 1919, was elected president.

From the close of the World War until the end of 1921 the company found its manufacturing facilities in Dover, N. J., stressed, and made advantageous connections elsewhere in order to obtain an uninterrupted supply of cast-iron boilers. Later it became necessary to make another extension move, and, in the latter part of 1927, the Utica Heater Co., Utica, N. Y., was purchased.

Efficiency of 89% with Powdered-Coal Boiler

Pulverized fuel installations seem to have reached a point where it will be almost impossible to improve them from the standpoint of thermal efficiency. Commonwealth Edison Company, Chicago, in its Calumet station, has a powdered-coal burning boiler from which some interesting performance data have been secured and presented in a paper before the Western Society of Engineers, by A. D. Bailey and W. H. Jensen. With only 5940 sq. ft. of surface in the boiler proper, a maximum output of 290,000 lbs. of steam per hour and an efficiency of 89% are obtained. The installation has double the output of 15,000 sq. ft. stoker-fired boilers in the same plant, occupies but 50% more space, and has but one-quarter the furnace maintenance cost. Over 90% of ash ordinarily passing to the stack is eliminated by a gas washer.



This Queer Jumble of Heating Types Is from a Catalog Issued in 1870

Dies After 72 Years of Service with One Company

What is certainly the longest service record in the gas industry, and probably the longest in any American industry, was ended July 14, with the death of John O'Connell, who had been in the employ of the Consolidated Gas Co., New York, for the past 72 years. At his death he was general foreman of the company's plant at 21st Street and Avenue A. Throughout his years of service Mr. O'Connell lived within a stone's throw of the plant, and repeatedly refused advancement lest he should have to leave the neighborhood, which he went out of but few times in his life. Once was when he rode to 125th Street and back in the subway three years ago, and another time was when he rode to the Battery, the only occasion when he ever had been below 14th Street. Mr. O'Connell was 89 years old when he died.

Wilbur K. Abernethy, district manager, Chicago office of the Central Station Steam Co., Detroit, died at his home in Chicago July 23. He was taken sick on his way to the Atlantic City convention of the National District Heating Association, and was compelled to stop at his father-in-law's home at South Bend, Ind. From then up till the time of his death he was seriously ill.

Mr. Abernethy was born in Iron Mountain, Mich., October 10, 1890. He attended school in Dayton, O., and then entered Ohio Wesleyan University, which he attended two years, after which he entered Purdue University, graduating in 1916 with the degree B.S.M.E. After his graduation, Mr. Abernethy entered the employ of the company with which he was associated at the time of his death. Mr. Abernethy saw service during the World War as a lieutenant in the aviation bombing division. He was widely known throughout the West and Middle West by those engaged in the heating industry. His splendid personality and knowledge of the business made him welcome wherever he went.

Seth Barham, assistant treasurer of the American Radiator Co., New York, died at his home, August 14, at the age of 60. At the time of his death Mr. Barham had completed 23 years of service with the company. Beginning as an employee in the treasurer's department in 1905, he served in various departments and also as a traveling auditor. In 1907, Mr. Barham joined the accounting department and less than two years later was appointed chief accountant, and in April, 1922, was promoted to the position of assistant treasurer, which he held until the time of his death.

T. W. Yocum New Executive of Oil-Burner Organizations

Announcement is made that Trell W. Yocum, one of the executives of the American Petroleum Institute, has been appointed managing director of the American Oil Burner Association and the Oil Heating Institute. This announcement was made by Leod D. Becker, the present managing director, who has been at the head of the two related organizations since their establishment six years ago, and who has resigned so that he may devote all his time to his publishing business.

"The present work and future growth of the American Oil Burner Association and its affiliated organization, the Oil Heating Institute," says Mr. Becker's announcement, "require the undivided attention of the executive in charge. The increasing demands of my publishing business have made it impossible for me to longer give this attention without a sacrifice of personal interests which I am unable to continue. In Mr. Yocum, the directors have chosen a man ideally fitted for the increasing responsibilities of the position. He is a seasoned association executive. He will bring to the oil-burner industry a thorough familiarity with the oil business, and his wide acquaintance with the leaders of the oil industry will be of material benefit to both the oil and oil-burner industries. His selection emphasizes the growing importance of oil heating and the readiness for co-operation on the part of the oil industry which was shown last December by the indorsement of oil heating on the part of the directors of the American Petroleum Institute."

Mr. Yocum was born in Mechanicsburg, O., in 1893, and graduated from Ohio State University in 1914. After leaving college he engaged in newspaper and magazine work in Cleveland. When the United States entered the war, he joined the first officers' training camp at Fort Benjamin Harrison, but shortly after was incapacitated for military service by temporary physical disability following a major operation. From 1917 to 1919, he was a member of the staff of Herbert Hoover. From 1919 to 1924, he was with the Crowell Publishing Company, first as managing editor of *Farm and Fireside*, and later as managing editor of *Collier's*. In 1924, he became secretary, and later director, of the committee on public relations of the American Petroleum Institute. Mr. Yocum will enter his new position October 1.

Reports from oil-burner manufacturers and dealers of materially increased sales presage greatly stimulated activities by the association under Mr. Yocum.

Photo by Blank-Stoller, Inc.

Trell W. Yocum, New Managing Director, American Oil Burner Association

Applying Oil Burners to Warm-Air Furnaces

That warm-air furnace manufacturers who will produce a furnace especially designed and adapted for oil-burning will be amply repaid, was the opinion expressed by John H. McIlvaine, president of the McIlvaine Burner Corp., Evanston, Ill., in a paper read before the National Warm-Air Heating Association at their fifteenth annual convention. Mr. McIlvaine went on to say:

"This design should offer no great difficulties. Fortunately for those concerned, in the warm-air heating and oil-burner industries, oil burned correctly at the rate of 1 gal. per hour requires approximately 3 cu. ft. of combustion space. Thus a furnace which has 3 sq. ft. of grate area with a height above the grate of 2 ft. can accommodate the combustion of 2 gal. of oil per hour. Assuming equal efficiencies, this amount of oil delivers approximately the equivalent heat of 21 lbs. of hard coal which checks with your maximum rate of combustion of 7 lbs. of coal per square foot of grate per hour. The shape of the combustion chamber should conform to the shape of the oil flame or vice versa. There are three common types of oil flames, vertical, circular, and horizontal. Here is an apparent difficulty which easily is overcome, however, as by suitable baffling and adjustment most oil flames can be distributed in any way desired. The indirect heating surface is of great importance. Your ratio of 20 sq. ft. of heating surface to 1 ft. of grate area should be a minimum, to keep stack losses as low as possible. Preferably the ratio should be higher. This, of course, will increase the cost of the furnace, but not necessarily in direct proportion.

"It is not necessary for you to increase your overall dimensions in direct proportion to the heating surface because you can reduce the cross section of your flue-gas passages as, with our mechanical draft burners, you no longer have to draw the air through a thick bed of coals. You also can employ the revertible flue principle to great advantage. The hot gases in this type of furnace rise immediately to the top near the leaders where the greatest heat is needed, and as they cool they descend to the smoke-pipe outlet at or near the grate line. Of course there is a limit to the reduction of flue area with natural-draft burners or burners of the intermittent type. With the latter class, sufficient cross section must be allowed to take care of starting when the furnace and stack are cold. One boiler manufacturer uses flues of small cross-section and revertible, but he furnishes a by-pass and thermo-damper to short circuit the gases to the stack if the temperature is below a predetermined minimum.

"It is interesting to learn that efficiencies of 80% and over are obtained with warm-air furnaces by the use of circulating fans. These can be connected to operate intermittently with burners of the on-and-off type, or continuously with continuous-flame burners. This is just one example of the benefits to be derived by exchanging ideas and the knowledge gained in experimental and field work."

An important point brought out by Mr. McIlvaine in his paper was that, although noise had been a great factor in applying oil heat to warm-air furnaces in the past, oil-burners now have been developed to such a point that they are exceedingly quiet in operation and entirely satisfactory for application to furnaces.

Kleen-Heet Dealers Hold Convention

More than fifty dealers from the central west territory attended a convention of the Winslow Boiler and Engineering Company, manufacturers of Kleen-Heet oil burners, held at the Drake Hotel, Chicago, August 2. Following an address of welcome by W. H. Rehm, president of the company, T. C. Kyle, national sales manager, and H. J. P. Rudolph,

general manager, presented a motion picture showing the sales possibilities for oil burners. Mr. Rudolph then addressed the meeting on the subject of "Combustion," and explained the work which has been done by the company in bringing out its new Challenger model. After a banquet at the Drake, at which J. S. Cooley, vice-president, acted as toastmaster, several other members of the organization, including visiting dealers, addressed the gathering.

Tour of Foreign Countries by Williams Oil-O-Matic Representatives

Representatives of the Williams Oil-O-Matic Heating Corp., Bloomington, Ill., have begun foreign travels that will take them to more than twenty countries. B. H. Miles, of the company's engineering department, will journey to Honolulu, Japan, China, India, and Africa, returning by way of Europe. A. T. Simmons, foreign sales manager, will visit various Canadian cities, after which he will sail for England and then tour the Continent, returning to the United States in the late fall.

Interest of foreign distributors in the new products of the company, the Dist-O-Matic oil burner and the Dist-O-Stove, and increasing demand in foreign countries for the Ice-O-Matic refrigerating machine, are responsible for the tours by these men, who will conduct schools of instruction in the countries they visit.

Silent Glow Convention

Nearly two hundred sales representatives of the Silent Glow Oil Burner Corp., Hartford, Conn., gathered at the home office for the third annual convention, August 6 and 7.

Distributors and retail salesmen discussed pertinent matters in group meetings Monday morning, and in the afternoon were driven to Camp Trumbull at Niantic, Conn., where they saw a practical demonstration of the Silent Glow 8R units used in the camp kitchens of the National Guard. From Niantic the groups drove to Waterford, where a shore dinner was served.

Tuesday the visitors breakfasted in groups at the Hotel Bond and later sat in on a general conference at the factory. In the afternoon, with the ladies of the party, a sheepbake was followed by outdoor sports in Goodwin Park. Among the guest speakers were Arthur Smith of the Hartford Chamber of Commerce, P. E. Fansler, associate editor, THE HEATING AND VENTILATING MAGAZINE, and Chief Moran of the Hartford Fire Department.

Plumbing and Heating Industries Bureau

Bureau Will Move to Chicago October 1

At a meeting of the executive committee of the Plumbing and Heating Industries Bureau, held at the Hotel Bellevue-Stratford, Philadelphia, Pa., July 23, it was decided to move the bureau headquarters from Evansville, Ind., to Chicago.

Directors present included President Thomas F. Nolan, A. M. Maddock, William Glen, C. V. Sheldon, Russell G. Creviston, William Scudder, H. C. Oliver, William Woolley, Jere Sheehan, John A. Quinn, Edward Penfrase, and E. L. Flentje.

The advertising committee of the bureau met in Philadelphia the following day and discussed present and future plans in connection with the advertising campaign.

Bureau Appoints New Manager for West Coast Office

Carl J. Marsh has been appointed manger of the West Coast branch of the Plumbing and Heating Industries Bureau, according to an announcement by Russell G. Creviston, general manager. Mr. Marsh will succeed John C. Keene, who will be assigned to special work in the Rocky Mountain district. For the last two years Mr. Marsh has been counsel for the Madison, Wis., Master Plumbers Association. He is a graduate of the University of Wisconsin, a practicing attorney, and for several years was the president of the Wisconsin Audit Company, public accountants. Many of the activities of the Wisconsin Master Plumbers Association were organized by and participated in by Mr. Marsh, among which was the establishment of a class in book-keeping in Madison to instruct the members of the association in the use of the accounting system of the bureau. Mr. Marsh assumed his new duties August 15.

Kansas City to Spend $50,000 for Modernization Campaign

Home modernizing programs are under way in Kansas City, Omaha, and Topeka, while Washington and Atlantic City are about to start their programs. Kansas City has raised $50,000 for a six-months' campaign and has employed a full-time man.

Contemplated primarily to bring the public to a realization that old but sound structures can be modernized and brought to complete usefulness, with property values restored, at a comparatively small expense, the campaign undoubtedly will result in immediate new business which will be additional to the normal building rate. The modernization program covers not only homes and apartments, but general business buildings, stores, hotels, etc. The Plumbing and Heating Industries Bureau, sponsoring the idea, is in touch with all developments of the campaign, and has detailed one of its field workers to assist with the organization work. Along with other ideas the campaign will convey the thought to the public that no home can be thoroughly up-to-date unless it has radiator heat and modern plumbing.

Heating and Plumbing Contractors' Finance Plan Outlined

A plan of financing, whereby a heating or plumbing contractor can sell a job on the installment plan without having to indorse the paper himself, was outlined by Charles J. Crockett, of the A. Harvey's Sons Company, Detroit, Mich., at a recent meeting of the Philadelphia Plumbing and Heating Development League. Arrangements are made with a finance company so that, 48 hours after the completion of the job, the contractor gets 95% of his money, and three weeks later gets the balance. This plan also enables the dealers to sell oil-burners and electrical refrigeration on a 15% margin without making the installation or servicing the apparatus during the guarantee period. Many Detroit contractors are participating in this plan.

Fuels Meeting to be Held in Cleveland

The Fuels Division of the American Society of Mechanical Engineers will hold its Second National Fuels Meeting at the Cleveland Hotel, Cleveland, September 17-20. Thirty-one papers will be read, among which are:

"Relative Values of Solid, Liquid, and Gaseous Fuels," by T. Ward, Massachusetts Institute of Technology, Boston, Mass.

"Fuels and Their Flame Characteristics with Reference to Combustion Values and Furnace-Space Require-

ments," by Henry Kreisinger and B. J. Cross, research engineers, Combustion Engineering Corporation, New York.

"Smokeless and Efficient Firing of Domestic Furnaces, Part II," by Victor J. Azbe, consulting engineer, St. Louis, Mo.

Members of the executive committee of the Fuels Division are: Victor J. Azbe, R. T. Haslam, E. C. Schmidt, William G. Christy, George A. Orrok, and John Van Brunt.

Central Steam Heating Plant Burns Gas

Five of the Westinghouse Airbrake Company buildings at Wilmerding, Pa., are heated by a central-steam heating plant with three 125 H.P. steel boilers each equipped with three 45 H.P. low-pressure gas burners. Cast-iron lighting doors are inserted in the brick walls above each pilot, two of which are installed in each boiler. Immediately in front of the burners, three checker baffles, 12, 20, and 30 bricks high, respectively, break up the gas flame and increase the transfer of heat to the exposed water tubes. Major variations in demand are made by cutting burners in and out by hand.

Steam is distributed at a pressure from 50 to 100 lbs. per sq. in. through welded mains, the longest run of pipe being about 500 ft. This system supplies the general offices, company office, Y.M.C.A., Y.W.C.A., and will later take care of an apartment house. For the winter of 1927-28, the gas consumption of the plant was over 28,000,000 cu. ft.

Industrial Gas Course to Be Held in New York

Dealing exclusively with salesmanship and its related topics, the fourth course for industrial gas salesmen has been announced by the industrial gas section of the American Gas Association, to be held at New York University, September 5 to 18. Among the lectures will be one on industrial heating requirements, by H. O. Loebell, vice-president and general manager of the Combustion Utilities Co., New York, and one on gas in relation to competitive fuels, by A. M. Apmann, engineer of utilization, Consolidated Gas Co., New York. Each of the 22 lectures will be followed by a round-table discussion, the balance of the session being taken up by the solution of problems.

American Gas Association Convention Program

An elaborate program has been provided for the five days, October 8-12, during which the American Gas Association will be in convention at the Million Dollar Pier, Atlantic City. There will be general sessions and sectional meetings throughout the period and an even larger exhibition of appliances and equipment than ever before. A meeting of the natural-gas department will be held under the chairmanship of S. W. Meals and special sessions devoted to public relations and technical subjects. A special train from Chicago will bring delegates from the Middle and Far West. The entertainment committee has provided an elaborate program, including a dance, ladies' luncheon and card party. On Thursday evening, full and exclusive use of the Steeplechase Pier, including all amusements and dancing, will be at the members' disposal. Reduced rates of a fare-and-a-half have been granted for members of the association.

On Thursday afternoon, October 11, a special session will be devoted to house heating with gas.

A.G.A. Testing Laboratory to be Largest in World

The American Gas Association Testing Laboratory, now being erected in Cleveland, when completed, will be the largest and most completely equipped institution of its kind in the world; $1,500,000 will have been invested, this sum including contributions made by manufacturers of gas-using appliances.

R. M. Conner, director of the laboratory, estimates that 30% of the gas-fired boilers and furnaces, 50% of the water heaters, 60% of the space heaters, and 75% of all gas ranges, sold during the year 1928, will bear the A.G.A. approval seal. In slightly over two years' operation, the present laboratory has examined and approved, from inspection or test, more than 8000 types of tubing and appliances.

Gas Industry to Be Represented at World Fuel Conference

The American committee of the World Power Conference has invited the American Gas Association to contribute three papers to the World Fuel Conference to be held under the auspices of the World Power Conference in London, Eng., September 24 to October 6.

"Domestic Heating by the Use of Solid Fuel, Oil, Gas, and Electricity," will be the subject of one paper, the preparation of which is in the hands of A. Gordon King, service engineer; C. George Segeler, industrial editor; and Eugene D. Milener, industrial research representative, of the A.G.A. headquarters staff.

Gas Heating to Be Used in Large Building

The first New York office building—outside of gas company property—to be heated by gas will be the model office building of the Cone Export and Commission Company, which will be completed in February, 1929. Cleanliness, dependability of fuel supply, completely automatic operation requiring no attendant, and the gas company's new heating rate, were all responsible for the selection of gas as the fuel.

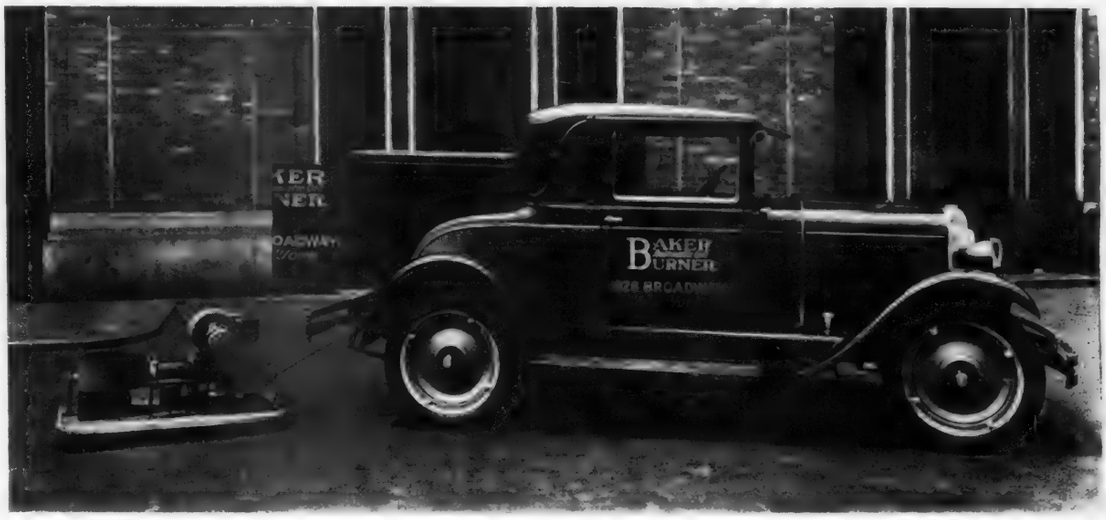
A. G. A. Engaged in Many Research Activities

The American Gas Association, in its research laboratory at Cleveland, O., is engaged in a program which takes in over sixty different subjects relating to the gas industry. Among the problems with which the research committees are engaged, and which are of direct concern to the heating engineer, are heating of large buildings with gas, research on mixed gases, design of draft hoods, furnace coils, house-cooling, house-insulation, large volume water-heating, and research in central house-heating appliances. Some of this work is being carried on in the laboratory at Cleveland, some by committees of the association co-operating with gas company and manufacturer members, and others under the jurisdiction of the committee on industrial gas research, which is financed by a fund of $100,000 a year for five years, established by the association.

Appreciable Saving Made by Use of Insulation

Savings amounting to $140 a year were made by a home-owner in Danville, Ill., according to a recent issue of *Building Supply News*, Chicago. As originally planned, the home would have required 1060 sq. ft. of radiation, and the cost of the boiler would have been $670. Since the owner wanted to use gas, which would have cost him $573, estimated, per year, it was decided to insulate the house in order to make gas-heating practicable.

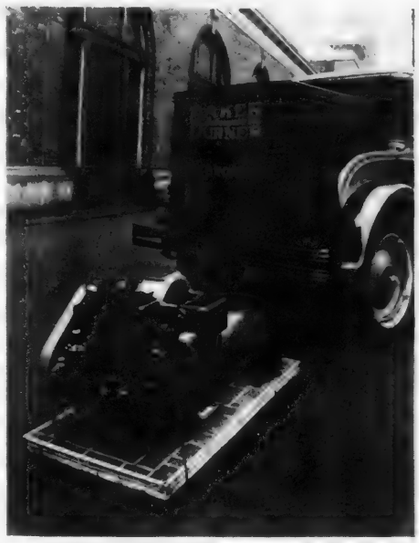
Insulation 4 in. thick was used in the ceilings and 3⅝ in. thick in the walls. The material cost $540, the labor and installation $210, or a total of $750. With the insulation, the architect computed the radiation at 514 sq. ft. but provided for 624.5 sq. ft. to be on the safe side. The smaller heating plant cost the owner $216 less than the price of that originally contemplated for the uninsulated house, while the first annual fuel bill was only $375, a saving of $198 based on the estimated cost with the uninsulated house.



Taking the Oil Burner to the Customer

PROGRESSIVE oil-burner distributors and dealers are making use of mobile units by means of which, if the prospective client cannot be brought to see a demonstration, the actual operation of the burner can be shown in the prospect's own place of residence or business. Usually a coupé is used, with a special compartment built on the rear of the chassis to carry the burner. In some cases a commercial-type of body, highly finished, is preferred.

The burner, preferably of special construction, with all possible parts of aluminum, for reasons of lightness, is mounted on a platform, equipped with wheels, so that it can be taken from the car and easily moved about. If the burner uses gas for ignition, a tank of "canned" gas is fixed in the car and suitable tubing provided to reach 20 ft. or more. A long extension cord provides



means of securing current, from the house circuit, for the burner motor. If the ignition is electric, it is taken from the same source. Oil fuel for the demonstration is carried in a tank in the car, and flexible piping conveys it to the burner. The thermostat is mounted on the platform.

A demonstration to a possible dealer can be made in his store, or at his home, where the demonstrating car is backed up to the garage which provides shelter from any wind that may be blowing.

One manufacturer reports that he has found that the use of such a device impresses the dealer with the idea that the manufacturer is wide-awake and modern, so that he is sold on the organization before he even sees the burner demonstrated. House-to-house canvassing by dealers is simplified and expedited by use of such an outfit.

Smoke-Abatement Campaign Making Progress in St. Louis

A REPORT of the Citizens' Smoke Abatement League of St. Louis, regarding progress being made in the campaign started in that city in October, 1927, shows that the average reduction in smoke density, as compared with the season 1926-27, was 46%. A detailed tabulation of the reductions in smoke density for the different classes of heating and power plants in St. Louis and its suburbs follows:

Table 1.	Per Cent
Industrial power plants	25
Railroads	41
Six-family apartments	63
Ceramic industry	63
Residences	66
Large apartments	68
Institutions	73
Flats, stores, and miscellaneous	75
Hotels, office buildings, and warehouses	80
Average reduction	46

In the smoke survey initiated in 1926, the distribution of smoke in the district was established. That is, the proportion of the total smoke made by each class of plant. By combining the index of average smoke density of one class of plant with the total amount of flue-gases produced by that class, a weighted figure is derived. Table 2 shows that the improvement in operation of the heating plants has caused the industrial plants to show a greater proportion of smoke than last year. This was due to the fact that about twenty chronic "smokers" in the industrial class made no improvement.

Table 2.	1927-28 Per cent	1926-27 Per cent
Industrial power plants	32	24
Ceramic industry	21	26
Flats, stores and misc.	14	8
Railroads	10	8
Six-family apartments	6	6
Residences	6	4
Large apartments	5	8
Institutions	3	4
Hotels, office buildings and warehouses	3	12
	100	100

It was found that apartment-house janitors are the most difficult persons to deal with in regard to improving smoke conditions. Inspectors reported that many of these are grossly ignorant, but, since they have been firing for many years, they feel they know all about firing. Boilers were found with doors, sections, and smoke pipes held together with baling wire, grates missing, bad water leaks, and tubes so filled with scale as to be useless. Down-draft boilers were found with the middle grates being used for the ash-pit. One fireman was found who for several years had been watching the chimney on the adjoining building to observe smoke conditions from his plant, notwithstanding that this chimney was on the opposite side of the building from where the chimney was located.

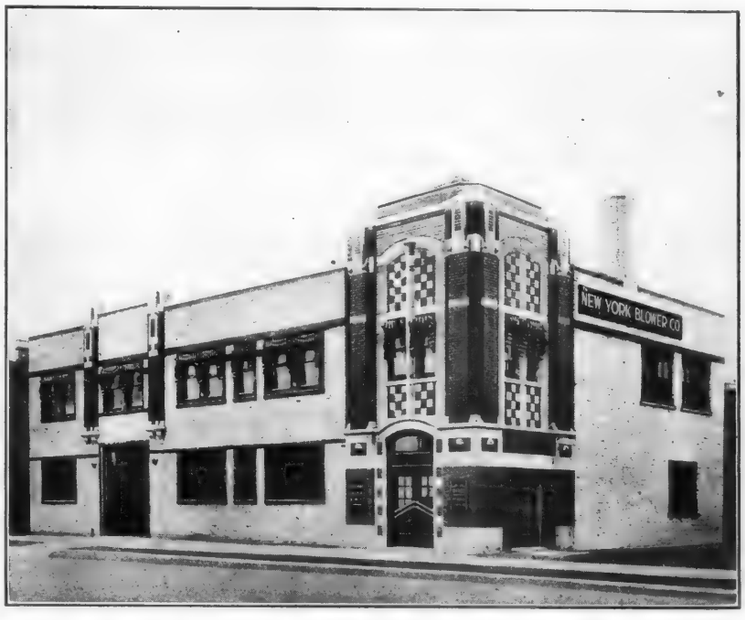
A fuel survey made in the metropolitan district, which includes St. Louis and its suburbs, simultaneously with the smoke-abatement campaign, showed that the use of more common fuels had increased as follows:

	Per cent
Bituminous coal (exclusive of West Virginia smokeless)	1.84
Coke	3.9
Anthracite	0
West Virginia smokeless	100
Industrial oil	0
Gas	9.14
Domestic oil	33.3

New York Blower Company Moves General Offices

General offices of the New York Blower Company have been moved from 2242 South Halsted St., Chicago, to new and modern quarters at 32nd St., and Shields Ave., Chicago. Planned throughout for efficiency and convenience, the new building is complete in all respects, and especially in regard to ventilation and illumination. Rough-textured walls, wrought-iron fittings, and linoleum tile-patterned floors add to the beauty of the offices.

Specializing in the manufacture of air-moving machinery, such as fans and blowers, air-washers and unit-heaters, the New York Blower Company has factories in LaPorte, Ind., and Chicago. It was founded in 1889, control in the company passing to Mathis Brothers in 1904, and has grown steadily, until today the factories have approximately 180,000 sq. ft. of floor area. The executives are: J. W. Mathis, president; J. H. Schrock and H. Mathis, vice-presidents; H. F. Maier, secretary; and Eugene Mathis, treasurer.



New Office Building of New York Blower Company, Chicago

Heating and Piping Contractors Association Activities

The Board of Directors will hold its fall meeting at the national headquarters, New York, September 17-18.

President Walter Klie has appointed the following to serve on the committee on certified heating:

A. R. Thompson, chairman, Norfolk, Va.; J. P. Baldwin, Chicago; J. Lawrence De Neille, St. Louis; N. W. Lunda, Memphis; Charles J. McCarthy, Philadelphia; A. Bachman, Cincinnati; and A. R. Herske, Cleveland.

E. W. Verity, New York, has been named general chairman of the membership committee for the coming season. On his committee are twelve members, one from each of the zones into which the country is divided.

The committee on standardization was so successful in carrying out its work in the past season that it has been reappointed *in toto* by President Klie. The Secretaries' Conference will be held at national headquarters, September 17-18, with A. R. Herske, Cleveland, chairman.

OIL-FUEL SPECIFICATIONS OF THE A.O.B.A.

(*Continued from Data Sheet No. 48-K*)

Oil No. 4. Fuel Oil—Light

Scope.....1—This specification covers a grade of oil generally known to the trade as light fuel oil intended for general industrial consumption. It is for use in burners adapted to a medium viscosity fuel.

Properties...2—This oil shall conform to the following requirements: It shall be a hydrocarbon oil free from water, acid, grit and fibrous or other foreign matters likely to clog or injure the burner or valves.

(*a*) Flash Point:
Minimum—(Pensky-Martens Closed Tester).. 150° F.
Maximum—(Pensky-Martens Closed Tester).. 250° F.
(*b*) Water and Sediment, maximum..... 1.0%
(*c*) Pour Point, maximum..... 15° F.
(*d*) Viscosity, Saybolt Universal at 100° F.
Maximum .....125 seconds

Method of Testing[1]..3—The properties enumerated in these specifications shall be determined in accordance with the following methods of test of the American Society for Testing Materials:

(*a*) Flash Point:
Standard Method of Test for Flash Point, by means of the Pensky-Martens Closed Tester (Serial Designation D 93).
(*b*) Water and Sediment:
Standard Method of Test for Water and Sediment in Petroleum Products by Means of Centrifuge (Serial Designation D 96).
(*c*) Pour Point:
Tentative Method of Test for Cloud and Pour Points of Petroleum Products (Serial Designation D 97-27 T).
(*d*) Viscosity:
Standard Method of Test for Viscosity of Petroleum Products and Lubricants (Serial Designation D 88).

[1] In event changes are made in the Methods of Tests by the A. S. T. M. the current Methods of Testing is to be used rather than those mentioned in the specifications.

(*Continued on Data Sheet No. 48-M*)

OIL-FUEL SPECIFICATIONS OF THE A.O.B.A.

(*Continued from Data Sheet No. 48-L*)

Oil No. 5. Fuel Oil—Medium

Scope.....1—This specification is that of the Federal Specifications Board for Bunker Fuel Oil "B" and covers a grade of fuel oil suitable for burners adapted to oil of medium heavy viscosity.

Properties...2—The oil shall conform to the following specifications: It shall be a hydrocarbon oil free from grit, acid and fibrous or other foreign matters likely to clog or injure the burner or valves. If required, it shall be strained by being drawn through filters or wire gauze of 16 meshes to the inch. The clearance area through the strainers shall be at least twice the area of the suction pipe and the strainers shall be in duplicate.

(*a*) Flash Point:
Minimum—(Pensky-Martens Closed Tester).. 150° F.
(*b*) Water and Sediment, maximum..... 1.0%
(*c*) Viscosity, Saybolt Furol at 122° F.
maximum .....100 seconds

Methods of Testing[1]..3—The properties enumerated in these specifications shall be determined in accordance with the following methods of test of the American Society for Testing Materials:

(*a*) Flash Point:
Standard Methods of Test for Flash Point by means of the Pensky-Martens Closed Tester (Serial Designation D 93).
(*b*) Water and Sediment—Standard Method of Test for Water and Sediment in Petroleum Products by Means of Centrifuge (Serial Designation D 96).
(*c*) Viscosity:
Standard Method of Test for Viscosity of Petroleum Products and Lubricants (Serial Designation D 88).

[1] In event changes are made in the Methods of Tests by the A. S. T. M. the current Methods of Testing is to be used rather than those mentioned in the specifications.

(*Continued on Data Sheet No. 48-N*)

Oil Burners for Large Low-Pressure Heating Plants

Pneumatic Turbine Burner. *Rotating-Cup Atomizing, Manual Ignition*

Previous articles in this series are:
1. *Todd*, August, 1927.
2. *W. N. Best*, September, 1927.
3. *Ballard*, October, 1927.
4. *Ray*, November, 1927.
5. *Johnson*, December, 1927.
6. *Petro*, January, 1928.
7. *Winslow*, June, 1928.

8. Simplex

SIMPLEX oil-burning systems have been in constant use for more than sixteen years, having first been developed on the Pacific Coast. Their use gradually extended eastward as the market was developed and fuel oil was made available. The Simplex Oil Heating Corp., 30 Church St., New York, with branch offices in the Builders Building, Chicago, and City Center Building, Philadelphia, handles distribution east of the Mississippi River; west of this line sales are handled by the Bunting Iron Works, the manufacturers, in Berkeley, Calif. The history of Simplex oil-burning systems is a record of continual advance and improvement along a single line of endeavor.

Simplex equipment has been designed to meet the requirements for heating commercial buildings of all types, for power plants, apartment houses, hotels and bakeries. It utilizes the principle of mechanical atomization of the oil by means of a pneumatic turbine-driven atomizing oil-cup. The dominating feature of the equipment is the simple method of control whereby proper proportions in the mixture of oil and both the atomizing and combustion air are maintained automatically under varying load conditions, thereby eliminating, to a very great extent, dependence on the human element, and not requiring a combustion expert as an operator, in order to obtain the most economical results over a wide range of fluctuating boiler loads.

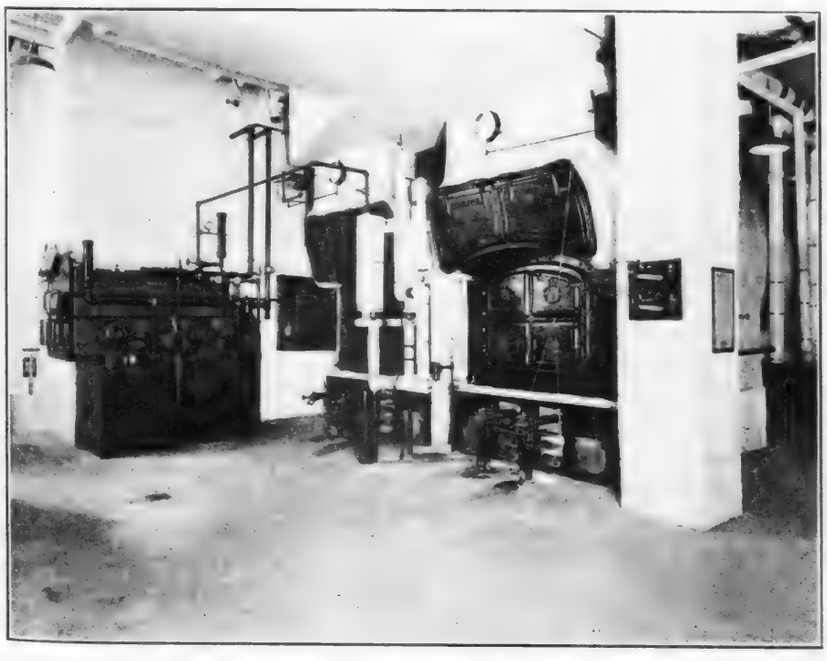
The Burner Unit

The Simplex turbine burner is made in two main sizes, designated as type "C" and type "M." Both are the model "U" which is approved by the Underwriters' Laboratories. The heating range on both these types is wide; the type "C" burner having a capacity from 2 to 35 gal. of oil per hour, and the type "M" burner from 15 to 75 gal. of oil per hour, and under certain conditions as high as 90 gal. of oil per hour.

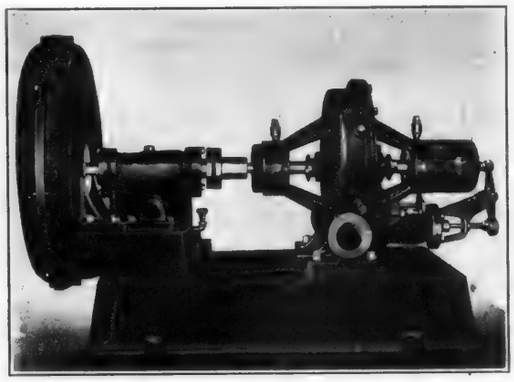
Each individual burner is provided with a synchronized control, one arm automatically adjusting the oil and the primary and secondary air (for atomizing and combustion) in a single operation and in their proper relative proportions. This control can be actuated by connecting it to an automatic regulator (the common types of damper regulators on either high or low-pressure plants are all that is required) by the boiler steam-pressure, or it can be moved by the operator, if desired, between the maximum and minimum settings, to meet varying boiler loads. Movement of this valve arm is restricted between maximum and minimum settings within the capacity range of the particular burner and boiler used, and these maximum and minimum stops can be locked and sealed in position, to prevent tampering by unauthorized persons, without the knowledge of those in charge.

Oil-Heated Ovens in a Modern Bakery

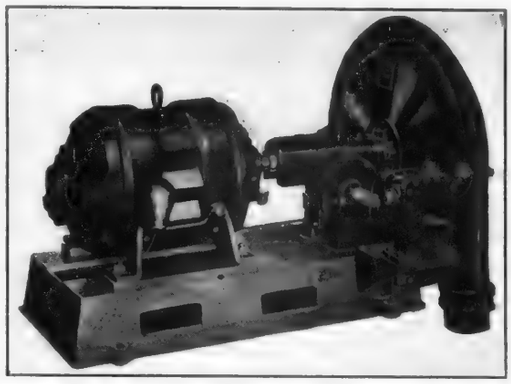
Each burner unit also is equipped with a by-pass oil fuel valve incorporated as an integral part. This by-pass permits quick starting of the burner with heavy cold oil, without requiring a change in valve orifice size or in adjustments. This by-pass also permits an immediate reversal in the direction of the flow of oil through the burner, should this become necessary, due to stoppage by sediment or otherwise, of the orifice valve opening, without shutting down the burner, or taking it out of service.



Typical Low-Pressure Heating Plant Fired with Simplex Oil Burner



Steam Turbine-Driven Oil Pump and Fan



Simplex Electric-Driven Oil Pump and Fan Unit

The oil pump, blower fan and motor (or steam turbine) are all mounted on a common cast-iron base which is provided with oil sumps cast integral for collecting and draining any surplus oil or drippings. The blower fan is direct driven through a mainshaft carried on two sets of ball bearings. The oil pump operates at slow speed through a reduction gearing from the main shaft. This reduction gearing consists of a case-hardened steel worm mounted on the main shaft, driving a bronze worm-gear, both being properly enclosed in a housing and running in a bath of lubricating oil. Flexible shaft-couplings are inserted on both sides of the reduction gear set.

Duplicate Sets for Emergency Use

The combination pump and fan units, usually installed in duplicate or multiple to insure reserve equipment for alternate or emergency service, are located in some convenient part of the boiler or pump room. These units are made in several sizes, having a wide range of capacities, and are capable of simultaneously serving from one to eighteen burners.

Fuels

Simplex equipment is designed for use with any grade of fuel oil of 12° A.P.I. gravity or lighter, and will handle 19° gravity or lighter fuel oil efficiently without the use of preheating equipment. Where the fuel to be burned is heavier than 19° gravity, proper preheating and circulating equipment is adapted to the particular requirements of the installation.

Oil Preheating System

The unique Simplex design of preheating system on low-pressure steam plants permits immediate starting with the heaviest grades of fuel oil after an overnight shutdown without the use of auxiliary fires or electric heaters. For this purpose an oil heater is employed, using water from the boiler instead of steam. This will maintain an oil temperature high enough for starting for many hours after steam pressure has dropped to zero. Under certain conditions, where there exist legal obstacles to the use of steam for heating oil in the storage tanks, a bronze rotary pump is installed to circulate water from the oil preheater shells to the tank heating coils.

Emergency starting, should the entire installation be cold, is made possible through a 5 K.W. electric immersion heater so connected and valved that it will quickly heat the water in the preheater shells. Through this system a boiler which has been shut down over a long period can be placed in operation, even with heavy cold oil, by the use of only the one electric heater, the heating element of which does not come in direct contact with any of the fuel oil.

With Simplex equipment it is possible to operate a plant at low power consumption, under average conditions less than 1% of the boiler horsepower developed being necessary for pumping the oil from the storage tank, atomizing it and projecting it into the furnace.

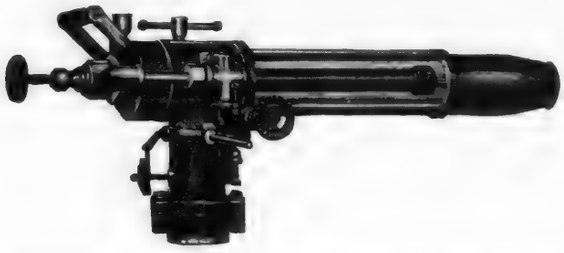
Firebrick combustion chambers for boilers, ovens or furnaces, are designed to meet local operating conditions and to give the most efficient firing conditions in the particular boiler, oven or furnace to which the equipment is to be adapted. Particular attention is paid to this phase of the installation especially to the correct arrangement of baffles.

Simplex equipment has been installed and is in successful operation in several plants of many of the largest nationally known organizations, such as the General Baking Company, National Biscuit Company, and U. S. Veterans Hospital, Northport, L. I.

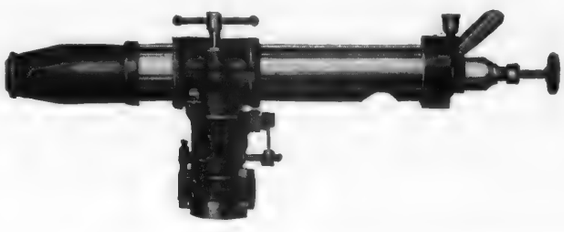
This equipment is sold with a complete oil-burning and engineering service, and an inspection service is maintained for old as well as the new plants, regardless of where they may be located.

Foreign Trade Last Year Exceeded Pre-War Business

An estimate that the volume of the world's export trade this year is more than 10% greater than the corresponding trade carried on before the war, was made by the National Foreign Trade Council at its convention at Houston. Texas. The 48 principal trading nations of the world did $19,482,000,000 worth of business last year compared with corresponding figures of $18,400,000,000 for 1925, which was the first year when the world actually exceeded the pre-war volume of exports. It was brought out, in the course of the sessions, that combined purchases of Latin Americans in this country, exceeding $900,000,000, were greater than their purchases from England, France and Germany combined during the year 1927.



Simplex Burner with Barrel Slide in Firing Position



Burner with Barrel Slide Withdrawn from Firing Position

Petro Agents Hold First National Convention

DISTRIBUTORS and agents representing the Petroleum Heat and Power Company, New York, gathered at the factory at Stamford, Conn., for a two-day convention, August 27-28. Nearly 300 assembled for an inspection of the factory on Monday morning, following which a program of unusual merit was carried out in the company's garage, which was decorated for use as a convention hall. The program was noteworthy for the high grade of papers presented, especially those of an engineering character, one entire session being devoted to technical aspects of oil burning. W. C. McTarnahan, president, gave the welcoming address. Important papers on the program were as follows:

Monday, August 27, 1928

Engineering Development and Research, James N. Macrae, chief engineer.
The Preliminary Engineering Survey, T. H. Smoot.
Tank Installation, J. B. Allen, Allen Engineering Company.
Installation of the Burner and Accessories, George Dawson, Jr.
General Description, Checking and Installation, Firing and Servicing the Burner, William P. Schenck.
Underwriters' Procedure, B. K. Breed, Underwriters' Laboratories, Inc.
Minneapolis-Honeywell Controls, J. W. Paulling, Minneapolis-Honeywell Regulator Company.
Small Motors as Applied to the Oil-Burner Industry, D. H. Byerly, Westinghouse Electric & Mfg. Company.
Heavy Oil Equipment Installation and Operation, R. S. Thorensen.
Fuel Oil and Delivery, George Dawson, Sr., supervisor fuel oil dept.
Engineering Installation and Service—"Open Forum."

Tuesday, August 28, 1928

How to Win a Sales Argument, Professors Borden and Busse, New York University.
Advertising, C. E. Widney, Kling-Gibson Company.
Domestic Oil Burning, Glen Arnold, second vice-president.
Petro Sales Appeal, E. H. Shea, manager, residence burner division.
The Story of the Industry, Leod D. Becker.

At the banquet, held at the Stamford Yacht Club on Tuesday evening, J. B. Deagar, of the Equitable Life Insurance Company, described the Petro installation in the Equitable Life Building. The formal address was by Homer S. Cummings, and the banquet was closed with a word of appreciation by W. C. McTarnahan, president.

Heat Transmission Nomenclature to be Simplified

The committee on heat transmission of the National Research Council recently appointed a sub-committee to investigate the possibility of improving the language, definitions, and symbols pertaining to heat transmission. Literature involving this subject has been in a highly chaotic state in the past, due to the fact that symbols and conventions never have been standardized, each writer using whatever was convenient to him. Headed by Dr. E. F. Mueller, of the Bureau of Standards, this subcommittee has submitted its report to the American Engineering Standards Committee for acceptance.

Among the work being carried on by the committee on heat transmission is that of drawing up a standardized procedure for testing solid thermal insulation; conducting a survey of active research work on heat transmission in progress at educational institutions and industrial laboratories in this country; sponsoring the preparation and publication of two textbooks on heat transfer. One of these texts will deal with the promotion of heat transmission, as in boilers, heat exchangers, oil stills, condensers, etc., and will be written by Prof. W. H. McAdams, of Massachusetts Institute of Technology. The other text will deal with retardation of heat flow in all its aspects, such as high and low temperature insulation, building insulation, etc., and will be written by L. B. McMillan, chief engineer of the Johns-Manville Corporation.

Crane Company Purchases Landon Radiator Company

Crane Co., Chicago, has purchased the Landon Radiator Co., Inc., North Tonawanda, N. Y. The Landon company will continue operation under its own name and there will be no changes in personnel. In the summer of 1926, Archer A. Landon, formerly vice-president in charge of manufacture for the American Radiator Company, organized and incorporated the Landon Radiator Company. Associated with Mr. Landon were E. H. Letchworth, Thomas Keator, H. P. Burgard, G. F. Rand and S. H. Knox.

First National Convention of Petro Distributors and Agents, Stamford, Conn., August 27-28

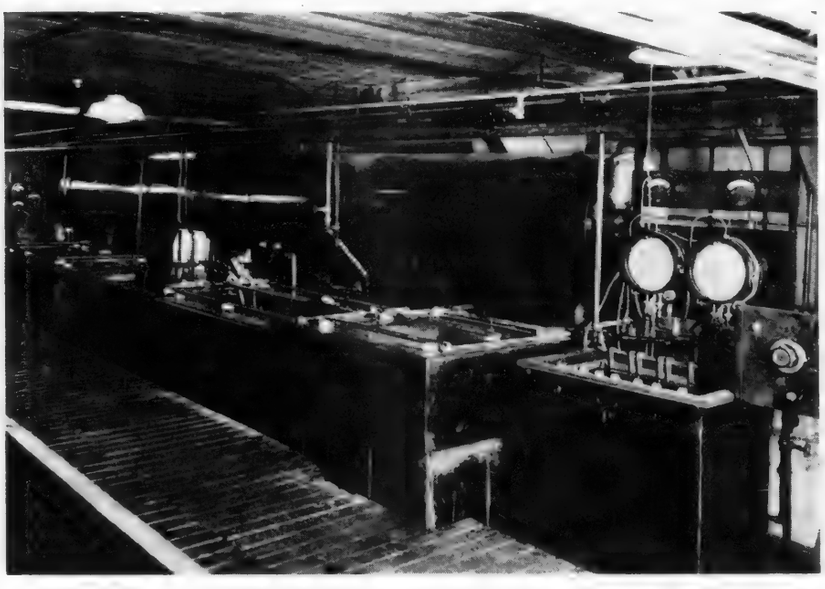
New Apparatus and Appliances

McQuay Concealed Radiators

A line of concealed radiators is announced by the McQuay Radiator Corp., Pure Oil Bldg., Chicago, Ill. Flat horizontal tubes, held in place by copper fins perpendicular to the tubes, make up the heating section which is nested firmly in bronze headers. The tubes are coated with tin on the outside to minimize dust accumulation. When the concealed heater is installed, the front part of the cabinet is flush with the wall, this front being removable so that all parts are accessible for cleaning. To control the flow of heated air through the cabinet and out into the room a damper is provided in the bottom, so that it can be operated with the foot. Capacities of these radiators run from 6.9 sq. ft. to 77.7 sq. ft., the cabinets being available in depths of 3 in., 5 in., 7 in., and 9 in.

Exhaust System for Removing Chromium Plating Fumes

An exhaust system for removing the injurious fumes from plating tanks now is being manufactured and installed by The Cleveland Blow Pipe and Mfg. Co., Cleveland, O. Around the top of the tank is a sheet metal duct, in the side of which, facing the liquid, is a narrow slot. A certain volume of air is drawn through this slot at a definite high velocity, depending on the size of the tank; the region of reduced pressure—below atmospheric—thus formed over the tank, prevents any of the fumes from entering the room, protecting the operator. Since no exhaust hoods are needed, there is no obstruction in the way of the workmen. Fumes from chromium plating tanks are dangerous as they rapidly destroy the tissues of the lungs and nose. This system is adaptable to other similar fume removal problems.

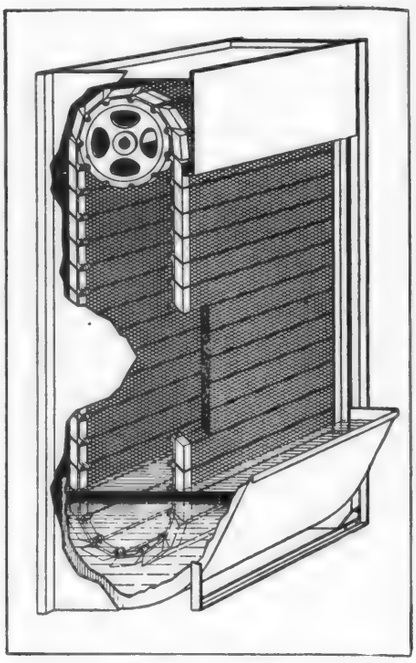


Especially-Designed Duct System for Carrying Off Plating Fumes

Double-Pass Air Filter

An air filter retaining the advantages of the Phoenix type, used in Europe for ten years, and having the additional advantage of being easily shipped and erected, the TooPas filter has been introduced by the National Air Filter Co., Chicago, Ill. Small units of multiple layers of woven copper ribbon and expanded metal in an endless belt arrangement pass over large supporting wheels at the top and through an oil cleaning bath at the bottom. With this apparatus two walls thus are placed in the path of the air to be cleaned, each wall being a filter in itself. The whole curtain is encased in a sheet-metal frame, 28 in. wide, 18 in. deep, in various heights.

Immersion in the oil reservoir cleans the filter because the dirt rests on a film of oil and is dislodged in the oil bath. As the dirt accumulates, a sludge is formed which can be scraped out without disturbing the oil; this operation takes only a few minutes and needs to be done only once or twice a year. A few turns of the top roller each week is sufficient, and since large installations can be turned with little effort no motor drive is necessary.



TooPas Air Filter

Permanent Metal Paint Brought Out by Subox

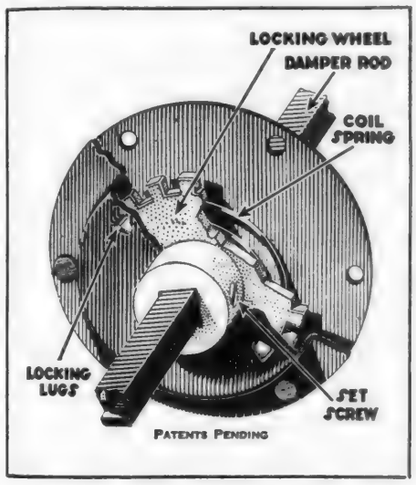
Protection by both paint and metallization is furnished by a metallic coating recently placed on the American market by Subox, Inc., 220 Church St., New York. Subox is similar to ordinary paint in that it consists of a pigment, suboxide of lead, and a vehicle-linseed oil. But where the value of paint depends upon the life of the vehicle, with Subox very slow but progressive chemical changes occur, which, in the course of a year or so, result in the actual deposition of a layer of metallic lead. The lead is in a highly dispersed condition, and its colloidal form gives a layer so compact as to be practically impervious to corrosive influences from without.

Thus the paint, or so-called paint, gives from the very start a protective coating which becomes increasingly effective as time goes on and the chemical reactions progress. It is recommended for all surfaces, indoor or outdoor, metal, wood, concrete, or similar materials, and is available in two types; No. 1 being the priming coat, and also the top coat for ordinary jobs; No. 3 is used as the top coat where severe corrosive fumes, vapors, gases, brine, or condensation exist. An additional coat of No. 3 is recommended where

sulphurs, ammonias, alkalis, chlorines, acetic acid vapors, etc., are encountered. Subox will withstand temperatures up to 400° F. Higher temperatures produce a change in color, but do not impair the protective qualities.

Damper Appliances for Ventilating Systems

Zenith damper-bearing plates and self-locking damper locks are announced by the Northern Weatherstrip Co., Duluth, Minn. An air-tight bearing is provided by the use of the bearing plate which consists of an offset housing and a circular steel washer with a square hole. The purpose is to provide an inexpensive, tight and neat bearing. In order positively to lock volume and split dampers in concealed ventilation ducts, the



Damper Plates Provide Self-Locking Feature

use of the damper lock is recommended. A socket wrench locks the device, thus insuring freedom from tampering.

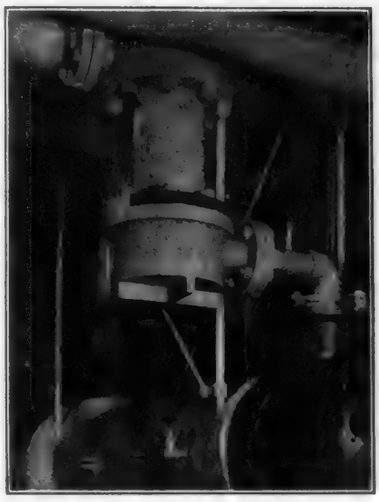
Sturtevant Tempervane Heating Units

A line of unit heaters, to be known as Tempervane heating units, has been announced by the B. F. Sturtevant Co., Hyde Park, Boston, Mass. An outstanding feature is the use of an efficient type of propeller fan, exactly suited in performance to the low resistance offered by the Aerofin heating element with which they are equipped. Tempervane units require a motor of approximately one-half the horse-power of heaters having housed centrifugal type fans, and consequently consume considerably less current. Made in a variety of sizes, these units are available in floor, overhead and cabinet types for steam pressures up to 350 lbs. per sq. in.

Tests Show Effectiveness of Air Separator

Tests on a Hickman air separator placed in the boiler-feed line of the S. S. Mana showed that the rate of air removal was 217 cu. in. per million cubic inches of feed-water. Additional tests were undertaken by Prof. C. F. Gross, of the University of California, who desired to ascertain the volume of air removed from the main feed-line to the boilers of the 16-story Matson Building, San Francisco. Unfortunately, the quantity of water fed to the boilers was not measured, although observation showed that the feed pump was in operation 16% of the time. The air and gases which had collected in the top of the separator were bled by a ⅛ in. valve to a large, inverted bottle filled with water, the mouth being below the surface of the water bath. As the air from the system entered the bottle it displaced the water, and since the bottle had been calibrated beforehand, the amount of air and gases removed from the system was determined. Air extracted from the top of the separator varied from 340 to 530 cu. in. per hour over a day's test; the temperature of the feed-water was 225° F. and the pressure in the boiler 8 lbs. per sq. in. gauge.

Further tests conducted by Professor Gross revealed the fact that the separator eliminated 95% of the air which had been injected in the feed-water on the suction side of the pump. A determination of the oxygen content of the water entering the separator was made during some of the tests since corrosion in piping may be caused by the combination of the iron in the pipe with the oxygen. Inasmuch as air contains 21%

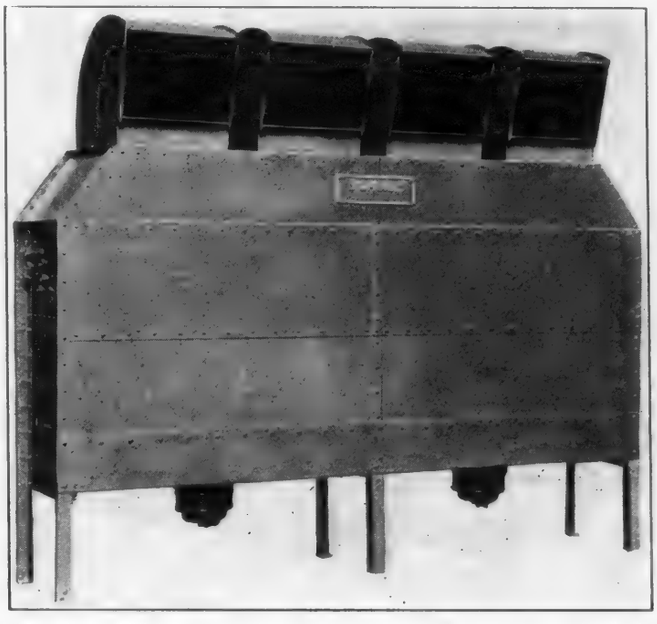


Air and Gases Are Taken from Boiler Feed Water by the Hickman Air Separator

of oxygen by volume, the elimination of air from a heating system plays an important part in reducing corrosion.

Trane Float Drip Trap Has Thermostatic By-Pass

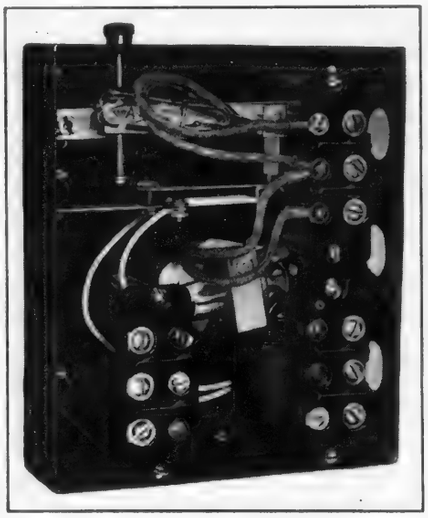
A float drip trap of the constant flow type is announced by The Trane Co., LaCrosse, Wis. This trap is built for service on unit and blast-heater installations and for commercial drying apparatus having a large condensing capacity. A thermostatic by-pass for eliminating the air and non-condensable gases is built into the trap, two types of which are available, one for low pressures up to 25 lbs., the other for pressures to 125 lbs.



Sturtevant Floor-Mounted Unit Heater Uses Propeller-Type Fan

Milburn Combination Cutting and Welding Torch Saves Time

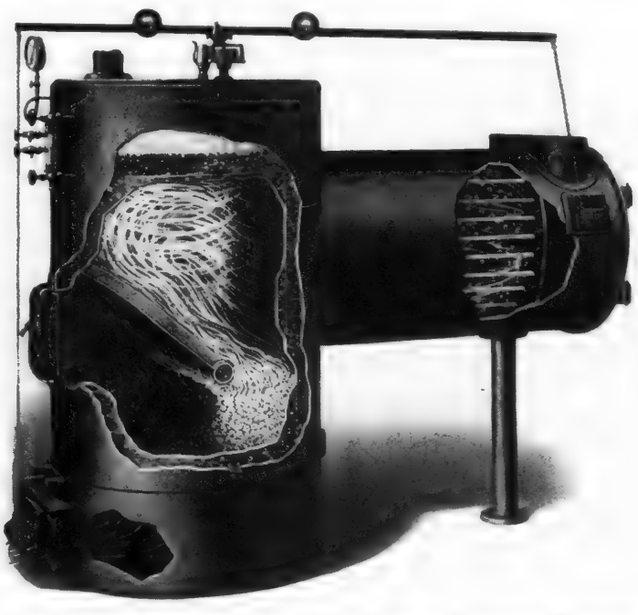
A torch which can be used for both cutting and welding without changing the tip is announced by the Alexander Milburn Co., 1416 W. Baltimore St., Baltimore, Md. To change from cutting to welding it is necessary only to give the tip a quarter turn. For cutting, the gases pass through preheating gas-passages while the high-pressure oxygen is carried through the central hole. In the other position the cutting oxygen is shut off, and the welding gases are conveyed through the central passage of the tip. The advantages of such a torch are that it saves the operator's time and avoids the necessity of purchasing two sets of tips.



No. 77 Lockswitch Supplies High Voltage Control of Oil-Burner Sequence Functioning

Fitzgibbons Smokeless Heating Boiler

Available in capacities from 400 sq. ft. to 3200 sq. ft. of steam or radiation, a line of smokeless, steel heating boilers is announced by the Fitzgibbons Boiler Co., Inc., 570 Seventh Ave., New York. In the front of the vertical, cylindrical firebox a baffle is placed, the back end of which extends to the fire level. When soft coal is burned the volatile gases from the green fuel in the front are forced down and back over the incandescent coke, secondary air being admitted over the green coal. A water tube is used to support the baffle and protect the edge; the face of the baffle is lined with a refractory. From the firebox the gases pass through fire tubes in a horizontal water space. If it is desired to burn hard coal the baffle can be removed, and this also should be done if oil or gas is to be burned. Tests at the company's laboratories showed that for average winter conditions an 8-hour firing period is entirely satisfactory.

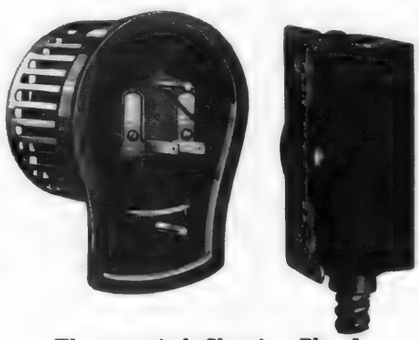


Fitzgibbons Smokeless Boiler with Water-Tube-Edged Baffle

Absolute Con-tac-tor Corp. Announces Sequence Control and Thermostat

In the No. 77 Lockswitch the Absolute Con-tac-tor Corp., Elkhart, Ind., has developed the basis for high-voltage sequence control of all phases of operation of power-driven oil burners, this device serving as the primary switching control and safety element. Sequence in the functioning of the Lockswitch safety and the recycling feature are governed from stack temperatures by use of the stack-switch. Normal operation of the burner comes under control of the thermostat or boiler control in the usual manner. In case of even momentary current failure, complete recycling takes place; ignition may be either gas, spark, or hot-wire type, and either intermittent or continuous. Among other features of interest are the simple timing adjustment, thermal safety, manual reset after lockout, and a safety lockout whose timing is independent of the motor load.

Having an electrical capacity of 300 watts, the Thermoswitch is available both for high or low voltage. Room-temperature control devices, until now, have not been supplied for high voltages. The low-voltage thermostat has incorporated in its design an arrangement making it possible to connect it in circuit by plugging it into a wall receptacle just as a plug-in portable appliance is attached to its circuit, so that there is no necessity to cut into the wall.



Thermoswitch Showing Plug-In Mounting

Harwin Heaters

A line of cabinet and concealed heaters and suspended unit heaters, designed to insure unusual control of the air currents, an even distribution of the warmed air, and lightness of weight, has been placed on the market by the Harwin Heater Co., New Haven, Conn. Before being offered to the trade these heaters were submitted to extensive laboratory study, as well as to tests in field service. Thermometer readings taken in rooms heated by the cabinet heaters show but little variation in temperature in various parts of the room. Instead of allowing the air to travel straight to the ceiling the cabinet directs the warmed air out into the room where it has a greater heating effect. Air flow through the heater is controlled by a damper above the heater element.

Harwin heaters have opposite end connections and the coils have sufficient slope to drain the condensation easily and rapidly, thus eliminating knocking

and hammering. Galvanized sheets protect the fins from damage when the cabinet is raised or lowered. The cabinet itself is strong and will not distort with ordinary handling and yet is light enough easily to be lifted for cleaning; it is covered with a smooth priming coat which can be finished to harmonize with the room.

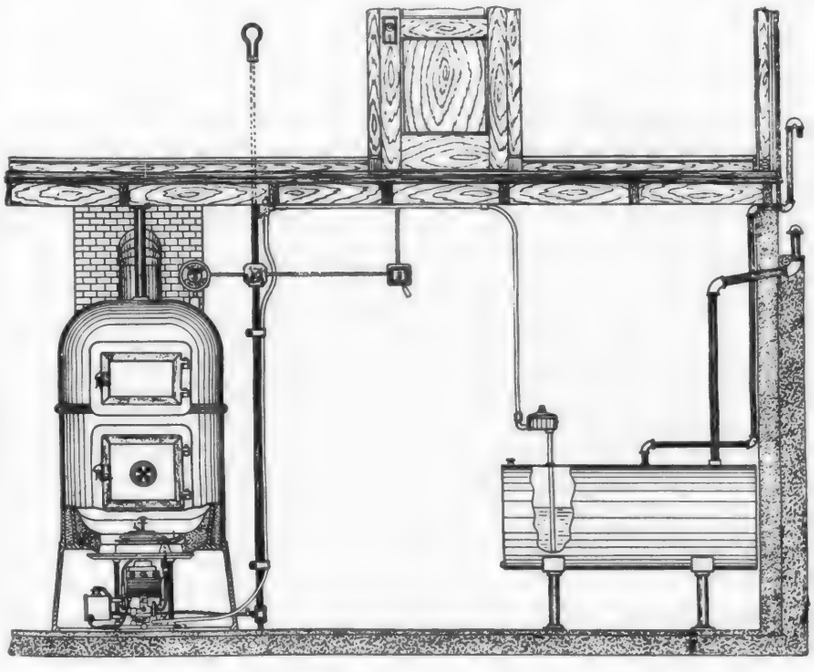
The concealed heater consists of heater element, grille, and the metal duct. To install, the heating contractor sets the heater in the usual manner, nails the stack in place and screws the grille in the channels provided, after which the wall is ready to plaster over with metal lath. When installed under windows a sheet of insulating material is placed next to the sheathing.

Harwin unit heaters are made up of horizontal fins closely pressed onto vertical tubing, the assembled units being dipped in a special molten solder. The core is encased in a heavy gauge metal casing with no projecting parts. This method of bolting the fan and motor frame eliminates, it is claimed, the danger of back drafts. These unit heaters are made in a standard type for factories, garages, and industrial purposes, and in a specially quiet type for offices and stores. This latter type cannot be heard above ordinary conversation.

Super Oil Heator Company's Model G

Model G, announced by The Super Oil Heator Co., 1027 Newport Ave., Pawtucket, R. I., follows the earlier types manufactured by this company, and is entirely enclosed within the base of the boiler in which it is installed. Special attention has been paid to the location of the fuel line, which is a copper tube carried from the tank up the cellar wall and along the ceiling to a point above the boiler, from which it is dropped down to the side of the boiler base. Electric ignition is used, the spark jumping from a fixed and insulated terminal to a disc fixed on the rotating shaft just below the nozzle. A special transformer winding is used to produce a fat, hot spark.

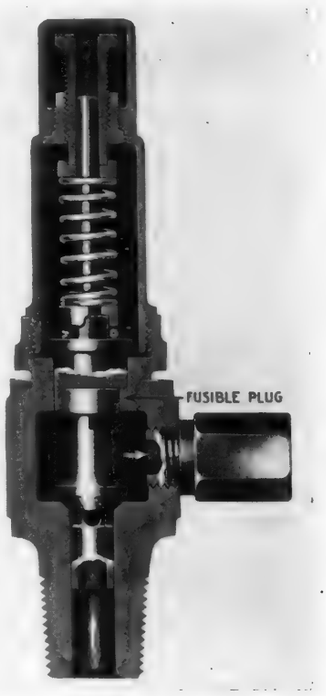
The motor is a ¼ H.P., 1725 R.P.M. repulsion-induction type, oiling of which is necessary only once a year. Model G is listed as standard by the Underwriters' Laboratories.



Installation of Model G Super Oil Heator with Fuel Line Carried Along the Ceiling Instead of Under the Floor

Safety Valve for Domestic Water Heaters

An emergency valve designed to shut off the gas supply to a domestic-water heater when the water temperature rises to more than 40° or 50° above the maximum limit required for household use has been announced by the Schutte & Koerting Co., Philadelphia, Pa. When this limit is reached, due to failure of the thermostatic valves on automatic heaters or neglect in the case of hand-controlled valves, a fusible plug becomes so soft that a light spring forces a valve spindle through the plug and the valve closes, shutting off the gas. An advantage of this valve is that the water temperature does not have to rise to steam temperatures to shut off the valve, as is the case with steam safety-valves when used for this purpose; another advantage is that the fusible plug is not in direct contact with the water itself, so that it cannot become corroded or fouled.



Domestic Water Heater Safety Device by Schutte & Koerting

Fabrice Brings Out High Temperature Thermostat

A mercury-switch type thermostat which can carry, make, and break electric circuits up to 45 amperes at 110 volts, or 40 amperes at 220 volts, recently has appeared on the market. The temperature ranges are, in one model, from 100° to 260° F., in the other model from 75° to 350° F., while the variation between on and off positions varies from 4° to 6° in commercial instruments, special ranges and variations being available on special order. These controls, which are manufactured by the Fabrice Thermostatic Control Co., 4750 Sheridan Road, Chicago, are operated by the motion obtained through the expansion and contraction of an alloy-steel rod fastened, at one end, to a copper tube, the free end resting against a multiplying lever which tilts the mercury-switch. The design of these controls makes them especially adapted for use with fans, blowers, air-conditioning equipment, furnaces, water heaters, steam boilers, and many types of industrial heating devices.

New Trade Publications

Steam Heating Economies Obtained in Pittsburgh Buildings Using the Hornung Pressure and Thermostatic System of Master Control is the title of a report compiled by L. B. Pittock for J. C. Hornung, 343 South Dearborn St., Chicago, Ill. Tabulated data are presented showing the estimated steam consumption for several large buildings and the actual steam consumption using the Hornung system. Temperature charts for the buildings, which include the W. J. Gilmore Drug Company Building, Thaw Hall of the University of Pittsburgh, Union Electric Company Building, Farmers Bank Building, and the Henry W. Oliver Building, also are shown.

The Simplest Way is the E.Z. Way appears on the cover of a booklet describing the air cleaning equipment manufactured by the Air Filtration Corp., 149 Broadway, New York. E-Z air filters are provided with a closed oil filter-reservoir entirely removed from the air filter proper, the reservoir being connected to the cleaning tank by piping. As the cleaning proceeds, the dust-laden viscous fluid immediately is withdrawn from the cleansing tank; the clean fluid flows from the oil filter-reservoir and cleans by flowing over and through the filter sashes, the dust filled fluid again being immediately withdrawn. After delivery to the reservoir the dust particles, being heavier than the liquid, slowly sink to the bottom of the sludge chamber, from which the sludge periodically is discharged. Each section requires cleaning at intervals of four to six weeks, the operation requiring from 15 to 20 minutes. These filters are available in seven types with capacities ranging from 4000 to 22,500 c.f.m. for a single section.

Oxwelding and Cutting Equipment is well cataloged by the Oxweld Acetylene Co., 30 East 42nd St., New York. Portable welding and cutting units, torches, complete stations, decarbonizing outfits, welding, cutting, lead-burning and heating blowpipes, gauges, regulators, and fittings are illustrated and described in this catalog. Acetylene generators also are described and a cutaway view shows details of construction. This book is of value to any contractor who owns, or intends to own, oxy-acetylene equipment. Size 6 in. x 9 in. Pp. 56.

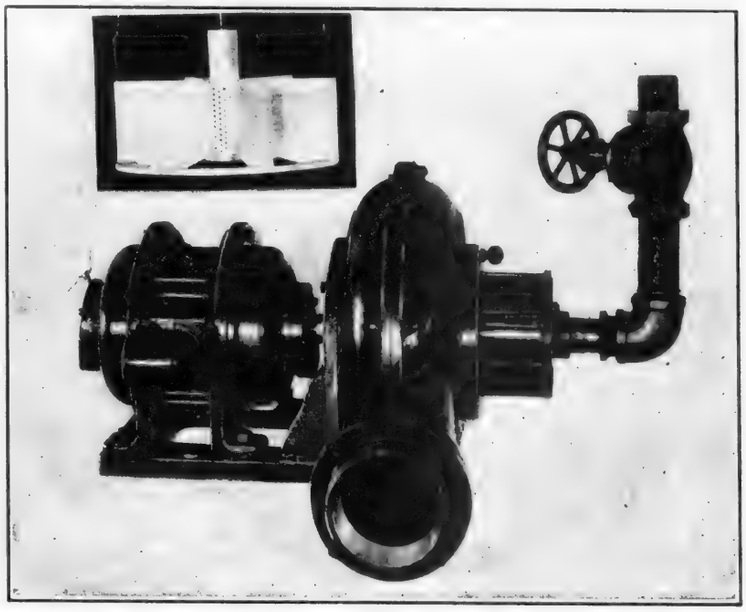
Summer Heat is used as the designation of a timely folder received from the Armstrong Cork & Insulation Co., Pittsburgh, Pa. Insulation usually is featured from the standpoint of its ability to keep the heat in the building; in this case the value of insulation in keeping excessive summer heat out is emphasized. Instead of using the heat-transmission coefficients to show the comparison between uninsulated and insulated roofs, the reciprocal, or heat-resistance factor of each material is utilized. Two examples of the advantages of insulating roofs of industrial buildings with Armstrong corkboard are cited from actual experience, both consisting of excerpts from engineering reports, and both claim that the insulated roof increased the efficiency of the workers to an appreciable extent during the summer.

Warm Air Furnace Dealer's Manual appears on the cover of a handbook issued by the National Warm Air Heating Association, Columbus, O. A general description of the warm-air heating business from the standpoint of the dealer is given, followed by an article on selling warm-air systems. For the guidance of officials of towns and cities, which as yet have no laws on warm-air heating, a standard ordinance covering that subject is presented. A short history and an outline of the aims of the association are also included, together with a list of active members. Size 4½ in. x 6 in. Pp. 164.

Air and Gas Mixing Blowers and Burners is the title of a folder issued by A. B. Knight, 117 East Park Ave., Fairmont, W. Va. The gas and air mixture is supplied through a number of small holes in the hub of a direct-connected, motor-driven, one-piece aluminum fan of paddle-wheel design; gas is supplied to the hub through a connection on the end of the shaft, while air is admitted through an adjustable shutter on the periphery of the hub outside the fan casing. Knight blowers can be supplied in capacities ranging from 125 to 12,000 cu. ft. of natural gas per hour, or from 225 to 20,000 cu. ft. of manufactured gas per hour.

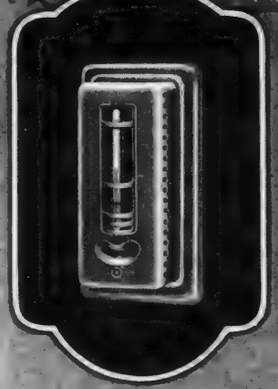
Economy Pumps are illustrated and described in a catalog, issued by the Economy Pumping Machinery Co., 3431 West 48th Pl., Chicago. This booklet gives brief information concerning double suction, single stage, general-purpose pumps of large and small capacity for moderate heads. Among the advantages of these units may be mentioned the use of two outboard bearings, between which the rotor is supported; the casing is split on the horizontal center line with the pipe connections in the lower half, so that it is possible to remove all rotating parts without disturbing pipe connections or the alignment of the unit. Along the same general lines, this company also has developed a series of small pumps to be used where the complete mechanical design required in larger units is not necessary. Type SM is particularly adapted for water circulation, brine circulation and house-tank filling where the total head does not exceed 100 ft. Head-capacity tables are presented. Size 8½ in. x 11 in. Pp. 24.

How Shall I Heat My Home? is the appellation of a consumers' booklet, published by the American Radiator Co., New York. Advocating radiator heat as opposed to warm-air, this little book shows the principal products of the company in attractive colored illustrations, with special attention to the Redflash boiler and gas water-heaters.



Motor-Driven Gas and Air Mixer for Manufactured or Natural Gas

POLICE DEPARTMENT HEADQUARTERS
BOSTON, MASSACHUSETTS
JAMES H. RITCHIE & ASSOCIATES, *Architects*, Boston, Mass.
R. D. KIMBALL CO., *Engineers*, Boston, Mass.
T. J. DUFF & CO., *Heating Contractors*, Boston, Mass.



The Powers Type D Thermostat

Does not need to be adjusted or overhauled annually. Often gives 15 to 20 years of accurate control without repairs of any kind. Gives true GRADUATED control. Uses only 10% of compressed air required by other thermostats. Costs more. It's worth more!

POLICE prevent loss *of* **PROPERTY** *and* **PROTECT LIFE**

THERMOSTATS prevent loss *of* **STEAM** *and* **PROTECT HEALTH**

A good Thermostat like a good policeman must be efficient, dependable, and ready for action at all times

THAT IS WHY

BOSTON POLICE HEADQUARTERS

was equipped with

THE POWERS TEMPERATURE CONTROL SYSTEM

THE POWERS REGULATOR COMPANY

35 Years of Specialization in Temperature Control

CHICAGO 2718 Greenview Avenue NEW YORK CITY: 137 East 46th Street

Offices in 35 Other Cities

The Canadian Powers Regulator Company, Toronto, Ontario

(4169)

POWERS

Ames Vacuum Heating Pumps are described in Bulletin 52 of the Ames Pump Company, Division of the Staten Island Shipbuilding Co., New York. A hurling water-impeller, by discharging centrifugally an expanding jet of water across an entrainment gap and through stationary compression plates, induces a flow of air, vapor, and condensate from the heating system. The vapor condenses, air is vented from the top of the hurling chamber, and the water flows into the storage chamber. Internal parts of these units, which are made in capacities from 12,000 to 150,000 sq. ft. of radiation, in single and duplex types, are of government bronze, while the venturi nozzles are of gun-metal. Each pump is guaranteed to maintain a vacuum of not less than 5 in. of mercury with condensate at 200° F. in a system reasonably free from air. Size 8½ in. x 11 in. Pp. 20.

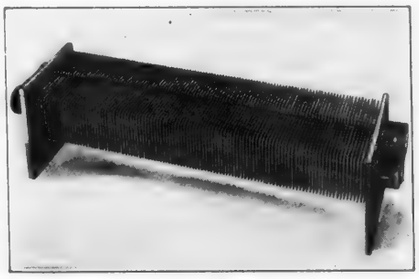
Thermoflex Heating Specialties are described in a bulletin bearing that name and published by the W. D. Cashin Co., 35 Hartford St., Boston, Mass. Designed for vapor and vacuum systems, this line of specialties includes radiator valves and traps, blast and drip traps, boiler feeders and alternators. The bellows used in these traps are formed with several hundred pounds internal hydraulic pressure, permitting the metal to flow freely, so that a strong construction results. Typical details are shown for the guidance of the engineer or contractor.

Price Pyrometer is the title of a catalog of recording and indicating pyrometers made by the Beckwith Machine Co., Ravenna, O. An explanation of the laws governing the action of thermo-electric couples is given, followed by descriptive matter and some engineering data, together with an outline of the uses of pyrometers. Size 6 in. x 9 in. Pp. 23.

Combination Triple Service Boilers are described and illustrated in catalog A-28, issued by the Combination Boiler Co., Benton Harbor, Mich. Either coal or oil can be burned in these boilers, so that in case of a failure of one fuel supply the owner easily can accommodate his unit to the other fuel. In the oil-burning type the combustion chamber for the oil is in the front of the boiler, while behind the baffle two auxiliary sets of grates are supplied, one above the other, the top one being a light type which can be removed easily, and on which garbage can be burned; the bottom set is for coal when oil cannot be used. It is necessary to remove the upper set of grates when the lower ones are to be placed in service. The coal-burning type of boiler essentially is the same as the one designed for oil except that there are no lower auxiliary grates.

Since the design makes possible the use of the boiler for house-heating, garbage incineration and domestic water-heating, these units are termed triple service boilers. They are constructed of steel, electrically welded, water-tube type, and based on the Johanson patent.

Convecto Radiators is the title of a catalog of radiators, heat cabinets, and enclosures manufactured by the Metal Stamping Co., Inc., Boulevard, 13th and 14th Sts., Long Island City, N. Y. The heating unit is made of various combinations of metals, among them being



Heating Element of Convecto Extended Surface Heat Cabinet

copper tubes and copper fins, aluminum tubes and aluminum fins, brass tubes and brass fins, and brass tubes and steel fins. In fabricating these units, the tube is expanded on both sides of each fin, or extended surface, with such force that a groove is made in the tube by the grip of the fins; the tube then is rolled into a malleable iron header, and the unit subjected to a test pressure of 100 lbs. of steam per square inch. A particular feature of the heat cabinets is that the humidifying pan, which lies under the top cover, can be filled through a small door without lifting the top. Double heat cabinets can be supplied in capacities from 23 to 75 sq. ft. either in a prime coat or choice of many special finishes. Radiators, consisting of the heating unit alone, range in capacities from 6.5 sq. ft. to 96 sq. ft. Small bathroom radiators in attractive stamped covers are rated from 4 to 15 sq. ft., the dimensions being so small that they are well adapted for rooms where space is as limited as it is in the bathroom. Size 8½ in. x 11 in. Pp. 24.

Armstrong Steam Trap is described and illustrated in a booklet received from the Armstrong Machine Works, Three Rivers, Mich. Incorporated in this device is an inverted submerged bucket, which is connected to a valve in the top of the trap by a system of compound levers. As condensate enters the trap from the bottom, it flows into and around the bucket. After the system is drained of water, steam enters the trap and displaces the water which overflows from the trap at the top. When enough steam has accumulated in the bucket to give it buoyancy, the bucket rises rapidly, closing the valve and preventing further discharge. The bucket is so weighted that it will rise when about two-thirds full of steam. As the steam condenses it is reduced in volume until the buoyancy of the bucket is overcome and the valve closes. Air binding is prevented by a hole in the top of the bucket. Complete information is given for figuring capacities, ordering, construction, installation and maintenance of the trap. Size 6 in. x 9 in. Pp. 32.

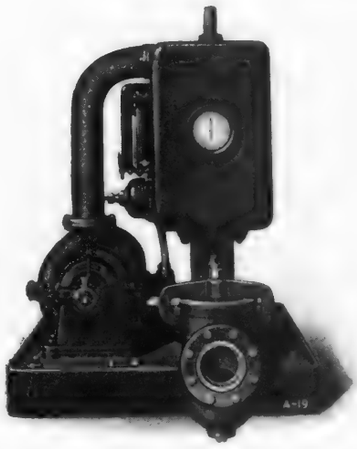
Semi-Welded Firebox Heating Boilers is the title of a booklet issued by the Wm. Bros Boiler & Mfg. Co., Minneapolis, Minn. Phantom views and roughing-in drawings are shown for the direct-draft and down-draft boilers described in this catalog. Direct-draft steel boilers are available in sizes with capacities ranging from 850 to 28,000 sq. ft. of steam radiation. The down-draft, or smokeless type, has the distinctive feature of an all-steel header in the rear of the firebox in place of the customary brick baffle. Smokeless boiler capacities run from 1560 to 30,200 sq. ft. of steam radiation. Size 8½ in. x 11 in. Pp. 23.

705 Architects and Engineers Agreed, a 4-page folder issued by the Chicago Pump Co., 2336 Wolfram St., Chicago, tells of an automatic alternator, a device which shifts the load from one pump to another alternately in a system using duplex pumps or ejectors. The apparatus is so constructed that each time a pump is called into operation the pump which was idle during the previous operation is called into play. Thus, instead of one pump being idle for several months and then being put into use, and perhaps failing to function due to rust, both pumps are constantly in use and in condition and the wear equalized. By not calling into use a rusty pump the danger of blowing fuses and possibly burning out a motor is minimized. In case the pump called on fails to respond the alternator will start the second pump, or, if necessary, will cause both pumps to operate, so that the alternator cannot prevent the pumps from performing under any circumstances.

1928-29 Handbook, Clow Gasteam Heating System, is the title of a booklet containing complete information on Clow Gasteam radiators. Capacities of the various sizes and types are given in B.T.U. as well as square feet. An outline of the advantages of Gasteam heat in apartments, stores, offices, halls, and factories, is followed by a discussion of operating and installation costs. Construction features of the different parts are described in detail, and instructions for starting, cleaning, and adjusting are given for the user as well as the installer. Engineering data on gas-pipe sizes and the calculation of radiation are included. Size 4½ in. x 9 in. Pp. 20.

The AMES Pump

Delivers all Condensate to Boiler Regardless of Temperature



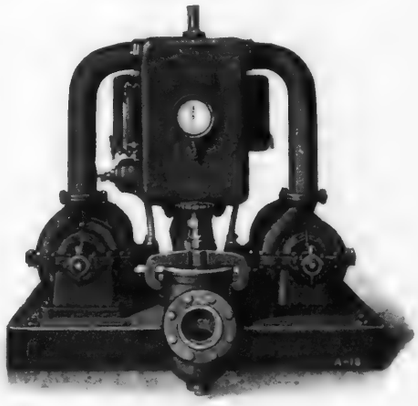
Single Unit

Consists of pump, ball bearing, 40° overload rated motor, receiver and air-separating tank, water gauge, compound gauge, thermometer, vacuum breaker, discharge check valve and self-cleaning suction strainer, all mounted on heavy cast base. Companion flanges, bolts, nuts and gaskets are furnished for suction, discharge and air vents.

THREE YEAR Guarantee Against Wear

Duplex Unit

Includes same equipment as above, but with the addition of a pump, motor, starter, transfer switch and built-in control valves.



The Duplex unit is preferred, since it not only saves space and cost of installation, but provides the all-important feature of a stand-by pump. Control valves permit the dismantling of either pump without disturbing any piping or shutting down heating system.

Write for Bulletin 52-C9

AMES PUMP COMPANY, Inc.

Division of STATEN ISLAND SHIPBUILDING CO.

90 West Street New York, N. Y.

DISTINCTIVELY DIFFERENT

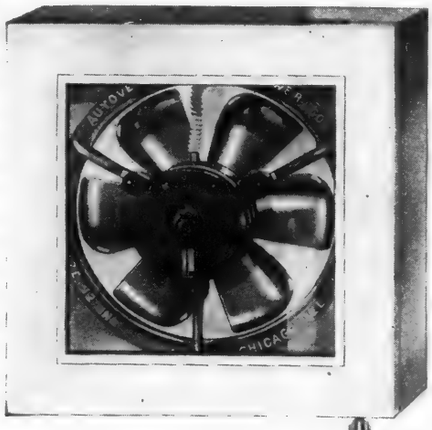
Draft-A-Justor Manual is the title of a compact handbook issued by the Draft-A-Justor Corp., 513 W. Jackson Blvd., Chicago, Ill. Engineering data are presented in graphical form and explained by easily-understood text showing the effects of draft on the amount of excess air, and consequently on fuel consumption, for oil, coal, and coke burning boilers and furnaces. Used in connection with Orsat tests on a boiler or furnace, by means of which the CO_2 in the flue-gas can be determined, together with a knowledge of the temperatures existing at the smoke outlet, these graphs enable the user to determine the efficiency of heat absorption. Information is given as to how to improve conditions, as they are found, by the use of the Draft-A-Justor, which is an adjustable damper equipped with a counterweight and mounted in a tee from the smoke-pipe, so designed that any increase in draft will open this damper, automatically decreasing the draft at the boiler. When the chimney draft decreases, this device closes, so that the draft at the boiler is not affected. A calibrated ring enables an observer to tell the draft for which the adjustor is set, in hundredths of an inch of water. Size 5 in x 7 in. Pp. 32.

Illinois Heating Systems is the caption appearing on the cover of a collection of reprints from advertisements in various national magazines featuring the vapor system manufactured by the Illinois Engineering Co., 21st and Racine Ave., Chicago, Ill. Altogether there are sixteen pages, each of which is devoted to photographs and text pertaining to some installation or group of installations equipped with Illinois systems in different cities.

Electrozone Ventilating Ozonators is the title of a folder distributed by The Air Conditioning & Engineering Co., 2914 South Jefferson Ave., St. Louis, Mo. Better ventilation at lower cost is said to be obtained by the use of this ozone generating unit, which is available in 5 types with capacities up to 75,000 cu. ft. of air per minute. The schools of St. Louis and the United Artists' Theatre of Los Angeles, are mentioned as examples showing the economy of operation and the benefits derived from the use of this equipment.

Wagner Bearing Construction, is treated in Bulletin No. 156, published by the Wagner Electric Corp., 6400 Plymouth Ave., St. Louis, Mo. Improvements in bearing design are explained in the bulletin, one feature being that the new sleeve bearing is completely sealed against the entrance of dust or dirt and the escape of oil. To facilitate replacement or servicing, the double-cap type of ball-bearing construction is used.

Autovent Cabinet Ventilators is the title of a folder recently issued by the Autovent Fan and Blower Co., 1805 North Kostner Ave., Chicago. This ventilator is designed especially for kitchens in homes, apartments, and hotels; the cabinet is of wood construction, highly finished in color. A glass panel door is provided to give protection from the cold when the fan is not running, its operation being controlled by a quarter turn of a handle. Adjustable louvres, opening or closing mechanically as the



Autovent Cabinet Ventilator for Kitchens and Similar Rooms

fan is turned on or off, are mounted in the exterior end of the cabinet and keep rain or snow from entering. Starting and stopping of the fan by moving the control handle thus also operates the glass panel and louvres, and to make control as easy as possible, the handle is furnished in lengths depending on the height of the ceiling, so that it is within easy reach of the operator. These ventilators have a capacity of 600 c.f.m., and are driven by an 850 r.p.m. a.c. or d.c. motor.

Warm Houses Make Contented Homes is the title of an elaborate booklet for the consumer, featuring the blue-front Economy furnace, manufactured by the International Heater Co., Utica, New York. An outline is given of the advances made in the warm-air furnace industry, with thumb-nail sketches along the margin of the page to illustrate the ideas expressed in the text. The research work of the National Warm-Air Heating Association is mentioned and briefly explained. Four colored plates are shown in connection with a description of how to harmonize warm-air registers with the room finish. This leads up to detailed information about the furnace, followed by a colored plate showing the blue-front furnace in a basement furnished for use as a den, with the leader pipes so taken off as to provide plenty of headroom. Size 10 in. x 13 in. Pp. 16.

1344 Per Square Mile is used to draw attention to an unusually striking broadside issued by the Kewanee Boiler Corp., Kewanee, Ill. A photograph taken from an airplane of a quarter of a square mile section of the South Shore district, Chicago, is shown with the house-roofs marked in red to indicate Kewanee installations, with an index given showing the names of all the buildings in which these boilers are in use, or on the ground. In this quarter section there are 366 boilers made by the company, which, as the folder points out, is equivalent to 1344 per square mile.

Surface Combustion House Heating Gas Burner is the title of a folder published by the Surface Combustion Co., House Heating Division, Toledo, O. This burner is designed to convert coal-burning boilers to the use of either natural or manufactured gas. Consisting of a circular burner above which is a baffle to throw the flames against the sides of the boiler or furnace, mixing tubes, and electrical controls, these units can be supplied in standard sizes to fit any boiler or furnace. Included with the controls is a safety pilot device, so that if for any reason the pilot light should go out the burner will completely be shut off within one minute. It is said that this unit can be installed in less than an hour.

Emerson Ventilating Fan Motors are described in Bulletin No. 3520 which has been published by the Emerson Electric Mfg. Co., St. Louis, Mo. Information in this booklet pertains to the 9-in., 12-in. and 16-in. units, with capacities ranging from 500 to 1250 cu. ft. of air per min. Fans are available in the three sizes mentioned for alternating current, but in the 16-in. size only for direct current. Mounting panels in wood and glass, steel wall-boxes, and automatic shutters for these fans also are briefly described.

The Newest Note in Home Heating is an attractive booklet of the Freed Heater Co., 110 Walnut St., Philadelphia, devoted to the Freed-Chaud boiler. Taking up the increasing use of color in the home, the booklet shows how color has spread from the bathroom to the kitchen and finally to the basement. Enameled casings for the Freed-Chaud boiler are obtainable in any color desired so that the home-owner may fit the boiler to any color scheme. The casing which encloses the round boiler is lined with 1-in. asbestos air cell and has registers in the sides so that the warmed air inside the jacket may be admitted to the basement. Designed for the consumer, the booklet outlines the advantages of radiator heat and explains the importance of proper draft, keeping the boiler flues and ashpit clean, good air valves, properly insulated pipe, and maintaining the correct water line.

EXTRA OIL HEAT OPPORTUNITY

HART NEWS

ALWAYS HART WEATHER

VOL. I. PEORIA, ILLINOIS, SEPTEMBER, 1928 No. 1.

14 SALESMEN JOIN HART

MORE JOBS THAN MEN 227 INQUIRIES

During the past few weeks the Hart factory has placed 14 new men in territories as Special Representatives, Distributors' Sales Managers, Salesmen, or Service Managers.

President MacInnis of the Preferred Oil Burners, Inc., says that "The demand for good men is far in excess of the supply. We make every effort to supply our dealers with capable, trained salesmen. Some of these men work on a straight commission basis only, some are on the factory pay roll, and some are on the Distributors' payrolls as Sales Managers. Our 'Help Wanted' file is growing larger every day with requests from both old and new dealers."

During the first three weeks of August, 227 requests for further information about the Preferred dealership, were received from prospective dealers. Many of these will become Hart dealers and will want salesmen and servicemen. Men are being placed in almost every section of the country. One of the men, who had lived in Illinois, and was placed in Denver, paraphrased the Navy slogan and made it "Join the Preferred and see the World."

WEATHER FORECAST

Fall—some rain, damp, chilly and raw. Protect with Hart Automatic Oil Heat morning and evening.

Winter—snow, sleet, freezing temperature. Prepare for sub-zero weather with Hart Oil Heat. Dealers can make Hart installations any day, regardless of weather, without house or building cooling off.

BEAUTY HINTS

There is a lot of difference between profits. Dealers' first profits are practically net profits with the Hart, due to the lack of service work these better burners need.

CLASSIFIED ADVERTISING

WANTED—ash cans for carrying out old ideas about heating homes.

HERB, AL AND HART CAMPAIGN

ADVICE TO P. O.

From all indications the Peoria Post Office will need extra help for both incoming and outgoing mail this Fall. Plans for the Hart big Fall drive provide for sending direct mail literature out from Peoria on dealers' mailing lists. This will result in hundreds of deposit slips coming in from dealers on HARTS sold. Post Office employees will think Christmas is early this year.

BOUNTIFUL ADS

This is in line with the Preferred-Hart policy of giving Hart dealers bountiful advertising assistance. Most dealers find that a flood of direct-mail advertising produces quick results, and quickly take advantage of the Hart Advertising Department's offer of free mailings to prospects.

Oil Burner Dealers PROFIT Comes from Money made on SALES Money saved on SERVICE

Preferred-Hart offers certain advantages that make sales more certain with less effort.

1. A small job especially designed for quick installation in warm air furnaces.
2. Four different size burners, all with successful heating history.
3. All Harts have Underwriters' approval to burn 28-30 fuel oil.
4. A franchise that definitely prevents the overstocking of dealers.
5. Factory list prices are low and discounts are generous.
6. Friendly, considerate, understanding treatment of dealers, because we have been dealers for years.
7. Sales assistance that has already helped many new Hart dealers to success.

Money made on sales can be lost on excessive service and installation costs—but not so on the Preferred-Hart.

1. Simplicity of the Hart Line is a big factor in service economy.
2. Wiring simplified so that it consists of merely a two-wire circuit.
3. No return line—no choke or float valves—no anti-syphoning device—no strainers to install in line—no pump priming.
4. Every part except motor and transformer made by Hart factory—a one-profit Burner.
5. All four sizes have had one or more successful heating seasons in the field.
6. Some dealers sum it up—"No Service."

HART OIL HEAT

Preferred Oil Burners, Inc.

PEORIA ILLINOIS

TABLE OF CAPACITIES OF STANDARD JENNINGS HEATING PUMPS

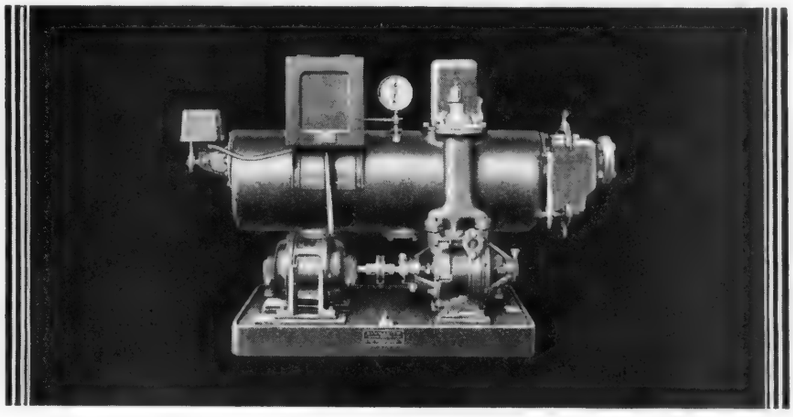
Size	Equivalent Direct Radiation sq. ft.	Diameter Standard Orifice Used for 10 inch Vacuum inches	Air Capacity cu. ft. per min.	Water Capacity At 180° F Against 10 lbs. Pressure gal. per min.	Actual H. P. for Delivering Water Against 10 lbs. Pressure	R. P. M. And Motor H. P. 10 lbs.		R. P. M. And Motor H. P. 20 lbs.	
						R.P.M.	H. P.	R.P.M.	H. P.
T	2,500	7-64	3	4	.33	3450	1/3	3450	½
U	5,000	7-64	3	8	.75	1720	¾	1720	1
A	8,000	9-64	5	11	.9	1720	1	1720	1½
B	16,000	3-16	9	22	1.4	1720	1½	1720	2
C	26,000	1-4	15	35	2.0	1720	2	1720	3
D	40,000	9-32	19	60	2.8	1150	3	1720	5
E	65,000	3-8	34	90	3.9	1150	5	1720	7½
F	100,000	1-2	52	140	7.0	1720	7½	1720	10
G	150,000	9-16	90	200	9.8	1150	10	1150	15

Air capacity not limited by water handled

MAXIMUM working air capacity of the Jennings Vacuum Heating Pump is always equal to the maximum published or rated air capacity. The same can be said about Jennings water capacity.

Moreover, the maximum *combined* air and water capacity in actual service is as great as the combined rated capacity. That is, the Jennings Pump removes rated volume of air, vapors and gases while it is handling the rated gallons of water per minute.

Jennings rated capacity is Jennings actual working capacity. The quantity of air withdrawn from the system is not limited at any time by the water being pumped. The one is independent of the other.



Jennings Pumps

THE NASH ENGINEERING CO 81 WILSON ROAD, SOUTH NORWALK CONN.

Trade and Miscellaneous Notes

Coming Events

September 17-20, 1928. Second national meeting of the Fuels Division of the American Society of Mechanical Engineers in Cleveland, O. Headquarters at the Cleveland Hotel.

October 1-3, 1928. New England industries meeting of the American Society of Mechanical Engineers in Boston, Mass. Headquarters at Statler Hotel.

October 8-12, 1928. Tenth annual convention of the American Gas Association in Atlantic City, N. J. Headquarters at Young's Million Dollar Pier.

October 8-12, 1928. Fall meeting of the American Welding Society in Philadelphia, Pa. Headquarters at the Bellevue-Stratford Hotel, and exhibit at Exhibition Hall of the Commercial Museum.

October 15-19, 1928. Fifty-seventh annual meeting of the American Public Health Association in Chicago, Ill. Headquarters at the Hotel Stevens.

December 3-8, 1928. Seventh National Exposition of Power and Mechanical Engineering in New York. Headquarters at the Grand Central Palace.

December 4-5, 1928. Mid-year meeting of the National Warm-Air Heating Association in Buffalo, N. Y. Headquarters at the Statler Hotel.

January 28-31, 1929. Annual meeting of the American Society of Heating and Ventilating Engineers in Chicago, Ill. Headquarters at Edgewater Beach Hotel.

April 9-11, 1929. Sixth annual convention of the American Oil Burner Association in New York. Headquarters at the Hotel Pennsylvania.

April 24-26, 1929. Annual meeting of the National Warm-Air Heating Association in Chicago. Headquarters at the Hotel Stevens.

Miscellaneous Notes

July building operations as reported by the F. W. Dodge Corporation show the highest July contract total on record, representing a 9% increase over the total for July of last year, but showing a decrease of 10% from the total for June of this year. The figures for the 37 states east of the Rocky Mountains were $583,432,400. Analysis of this record shows that 39% of all construction was for residential buildings, 23% for public works and utilities, 16% for commercial buildings, 6% for educational projects, and 5% for industrial projects.

Contracts in New York State and Northern New Jersey amounted to $137,685,000, representing a decrease of 22% from the total for June of this year and 12% from the total for July of last year. The New England States report a contract total of $36,592,400, representing a 17% increase over the same month of last year, but showing a drop of 11% from the total from last month.

In the Middle Atlantic States figures amounted to $62,212,100, which was the highest July contract total ever recorded for this district. It was 16% over the total for July of last year, but there was a decrease of 19% from the June, 1928, total. Contracts in the Pittsburgh district amounted to $64,361,600, representing a decrease of 18% from the total for June of this year and a 4% decrease from the total for July of last year.

A record month was reported for the Central West, amounting to $201,981,400,

Advantages

Fewer units are needed for equivalent heat radiation; the job is installed quicker, thus saving on labor time.

Fewer traps or valves needed; another important saving in cost.

Less piping, fewer fittings; labor cost further reduced by shortening time required to complete installation.

Overhead installation further reduces cost where floor-space is at a premium.

No hot, over-night fires necessary.

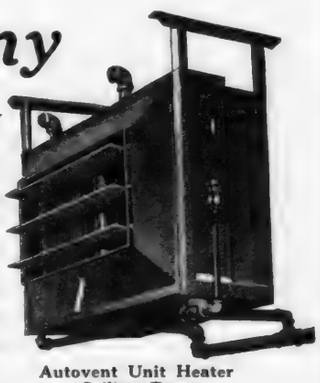
Greater flexibility of control gives more rapid heat spread for same amount of steam used.

Each unit individually controlled and can be shut down when not needed; a vital saving.

Cost of maintenance is less because of fewer units to look after.

There are many other construction features too numerous to mention here Let us send full details.

Double Economy



Autovent Unit Heater Ceiling Type

The Ceiling Type Unit Heater is not only economical in its method of delivering heat to the room, but adds another phase of saving by allowing the utilization of more floor space.

The Autovent Ceiling Type Unit Heater is up out of the way and at the same time performs a method of heating which places the heated air where it is wanted—at the working level. The over-heated temperatures at the upper part of the work room are reduced, which results in better heating and lower costs.

The construction of Autovent Unit Heaters merits careful consideration. The motor is of heavy duty design and is easily accessible for oiling and inspection. The fan wheel is specially designed and of rigid construction. Heater casing is constructed of sheet steel securely braced and riveted. Tapered discharge, a strictly Autovent feature, provides maximum flow of heated air without resistance. Diffusers can be quickly locked in any desired position. Autovent Unit Heaters are furnished with copper-fin type radiation for either high or low pressure.

SEE OUR CATALOGUE IN SWEETS

AUTOVENT FAN & BLOWER CO.

1805-27 N. Kostner Ave., CHICAGO, ILL.

which was the largest monthly total ever recorded in this territory. Figures showed a 5% increase over last month and a 35% increase over the total for July of last year. In the Northwest contracts amounted to $8,604,700, being an increase of 11% over the total for June of this year, but showing a decrease of 24% from the total for July, 1927.

Figures for the Southeastern States amounted to $52,791,400, representing an increase of 2% over the total for June, 1928, and 20% over the total for July, 1927. Texas reports $19,203,800 in contracts, showing a decrease of 27% from the record of June, 1928, and 6% from the total for July, 1927.

Claude Hartford, formerly manager of the Industrial Relations Department of the New York Steam Corporation, has resigned to become vice-president of the American Elevator & Machine Corp., 113-115 Cedar St., New York. Mr. Hartford was associated with the New York Steam Corporation since 1913, serving successively as assistant to the chief engineer, superintendent of the district comprising the lower portion of Manhattan, and engineer of the contract department.

Earl Marr, president of the Marr Oil Heat Machine Co., Minneapolis, Minn., who has been associated with the oil-burner division of the Philadelphia Electric Company, has withdrawn from active work in the Philadelphia company and established his headquarters in Philadelphia where he will direct the sales of the Marr oil burner. The Philadelphia Electric Company will continue to market the Marr burner.

Manufacturers' Notes

Oil City Boiler Works, Oil City, Pa., has appointed William B. Conlin, formerly metropolitan representative of the U. S. Radiator Corporation, as its representative for the territory of Manhattan and New Jersey.

United States Radiator Corp., Detroit, Mich., announces a quarterly dividend of $1.75 per share on preferred stock, and 50 cents per share on common stock to stockholders as of July 1.

Gulf Oil Burner Co., Philadelphia, Pa., announces that M. A. Squier has been appointed sales manager to succeed S. Silvers. Another appointment is that of Beaudette & Graham Co., 915 Boylston St., Boston, Mass., as distributor in Massachusetts, New Hampshire, Maine, Vermont, and Rhode Island.

Trane Co., La Crosse, Wis., with eastern division offices at 600 South Delaware Ave., Philadelphia, Pa., announces the appointment to its sales staff of Morris L. Potts, to cover the Philadelphia district. Mr. Potts formerly was connected with the American Radiator Company's Philadelphia branch.

National Radiator Corp., Johnstown, Pa., announces the election of Rudolph B. Flershem as chairman of the executive committee, and Grant Pierce as president of the company, to succeed Edward Norris, resigned. Mr. Flershem formerly was vice-president and general manager of sales of the American Radiator Company, which position he resigned a year ago to become vice-president of the Marine Trust Co., Buffalo. The latter position he will retain. Mr. Pierce formerly was manager of the New England territory of the American Radiator Company.

Williams Oil-O-Matic Heating Corp., Bloomington, Ill., has bought the controlling interest in the Mechanical Devices Co., of Aurora, Ill., including its patents. The plant, which has been moved to the Williams factory, manufactures a direct-drive rotary pump used in the Oil-O-Matic and Dist-O-Matic oil burners, which also is sold to other oil-burner manufacturers, and this outside business will be continued. New officers are: W. W. Williams, president and treasurer; C. U. Williams, chairman of the board; secretary and director, F. E. Sperry. Revised constitution and by-laws, replacing those of the corporation organized in 1919 and capitalized for $100,000, have been approved by the Illinois Secretary of State.

Combustion Fuel Oil Burner Co., Milwaukee, Wis., has appointed Prossen-Meder Corp., 1834 Broadway, New York, as distributor for the Combustion burner in the territory comprising northern New Jersey, New York, and the New England States. A warehouse stock will be carried at the Bush Terminal, Brooklyn.

Herman-Nelson Corp., Moline, Ill., announces the establishment of its New York office as a branch office, with T. H. Robinson, formerly New York sales representative, as branch sales manager. Headquarters will be at 25 West 43rd Street.

Fitzgibbons Boiler Co., Inc., Oswego, N. Y., will build an airport in Oswego, east of its boiler works, for the landing of army and civilian planes. This venture will benefit the military post at Fort Ontario, which has rather a small landing field.

Raytheon Mfg. Co., Kendall Square Bldg., Cambridge, Mass., announces that the mercury switch department of the Q. R. S. Music Co., Chicago, and the Fabrice Thermostatic Control Co., Chicago, have been merged with them. A modern factory is being installed for the manufacture of mercury switches. Eastern sales will be handled direct from the Cambridge plant, and western sales will be continued under the supervision of George Fabrice from the Chicago office in the Emerman Building.

Hardinge Brothers, Inc., Chicago, announces that at a recent meeting of the board of directors, Franklin Hardinge was elected general manager in addition to his position as president of the company. This follows the resignation of A. F. Schmudde as general manager and vice president. Dudley Robinson was elected vice-president and treasurer, having served the company for many years in other capacities.

Another announcement is that the company has secured the services of William Kemp as director of sales. Mr. Kemp formerly was assistant to the president of the American Nokol Company.

E. K. Campbell Heating Co., 2441 Charlotte St., Kansas City, Mo., suffered a loss of $30,000 by a fire which destroyed its building, August 4. The company, which manufactures heavy steel furnaces and unit heaters, will erect immediately a temporary canvas structure, inside of which a steel building will be constructed.

Illinois Engineering Co., Chicago, has appointed the following representatives: W. N. Hisey, 711 Martin Bldg., Birmingham, Ala.; C. O. Miller Co., 822 Home Insurance Bldg., Little Rock, Ark., and Murphy Engineering Co., 607 North Scott St., Wichita Falls, Tex.

Electric Arc Cutting and Welding Co., 152 Jeliff Ave., Newark, N. J., announces the appointment of F. B. Swankhous as sales manager of the company.

American Nokol Co., Chicago, has appointed C. T. McKelvy general sales manager and O. P. Harris assistant sales manager. Mr. McKelvy formerly was promotion manager for the Brunswick-Balke-Collender Company, and Mr. Harris also was connected with this concern. C. D. McKinnon, formerly sales manager for the Sonora Phonograph Company, has been appointed eastern sales manager.

May Oil Burner Corp., Baltimore, Md., announces the following appointments: Harry E. Orr, formerly with the Andes Range & Furnace Co., is New England factory representative; W. S. Karn, who has been representing the company in New York City, has been made manager of the metropolitan territory, including northern New Jersey and Long Island. The Mutual Oil Co., Rome, Ga., has been appointed a representative.

Wayne Home Equipment Co., Fort Wayne, Ind., has been organized by the Wayne Pump Co., of Fort Wayne, manufacturer of gasoline pumps and allied equipment, as a division of the company to manufacture and sell the Wayne oil burner and refrigerator. The officials of the Wayne Company will manage both concerns.

Jack: "Thought you hadn't much use for soldered joints."

Old Timer: "Right you are!—and there's not a drop of solder used to strengthen joints in Grinnell Thermolier."

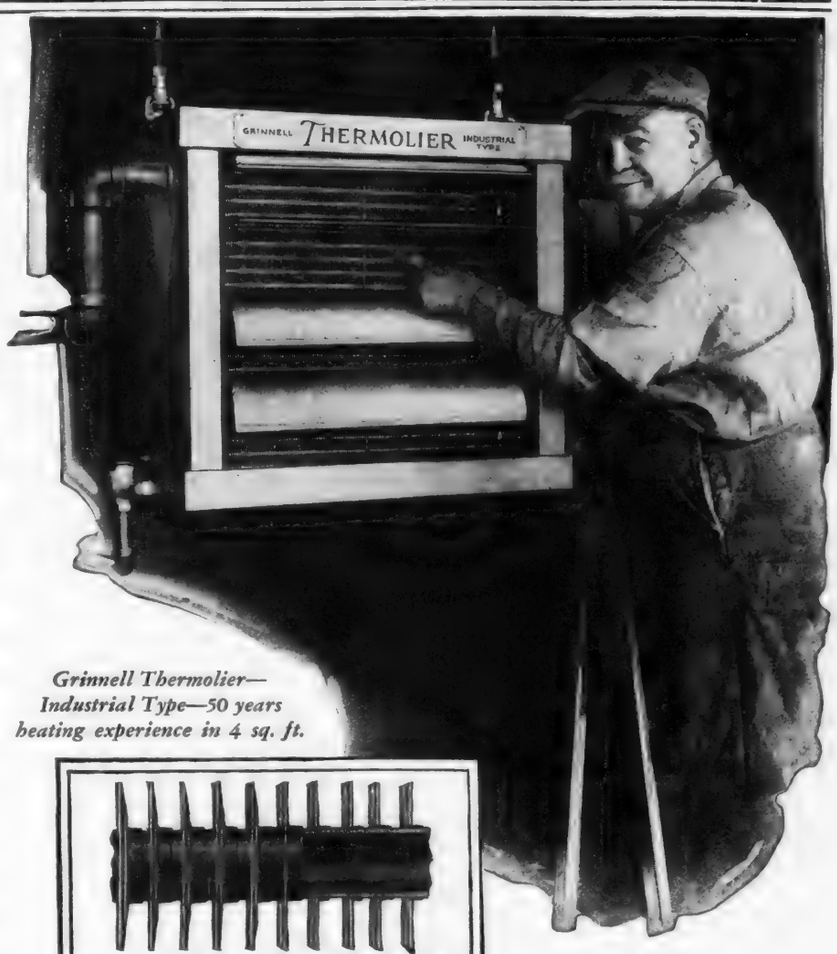
The Old Timer Knows

SEAMLESS copper tubes expanded into cast iron header plates with no solder used (or needed) to strengthen the joints,—that's one of the 14 points which make the Grinnell Thermolier a good "buy."

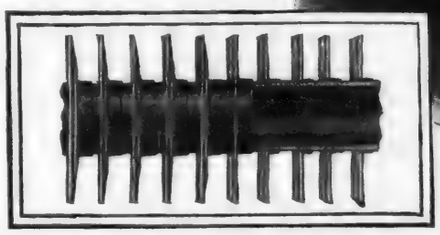
The final immersion of the tube and fin assembly in a solder bath is not a strength factor but is merely to establish a permanent metal bond making for faster heat flow between the tubes and their fins.

Strength and protection against leakage depend entirely upon the expanded (or rolled) joints into which no solder enters,—and perfect, time-tried joints they are.

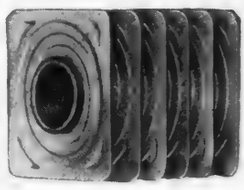
Write for free booklet describing the other 13 points of superiority of Grinnell Thermolier.



Grinnell Thermolier—Industrial Type—50 years heating experience in 4 sq. ft.



Cross section photograph showing how the deep tight fitting collars on the fins provide ample support and large metal contacts for rapid heat transfer from tubes to fins.



Stamped fins ⅞ in. square provide 24% more area than round fins occupying the same space. This accounts for the larger amount of heat obtained from the small frontal area of Thermolier.

GRINNELL COMPANY

Executive Offices: Providence, R. I.

Branches in all Principal Cities

14 Points of Superiority

GRINNELL COMPANY, INC.
208 W. Exchange St., Providence, R. I.

I want to read more facts about the Thermolier. Send along the booklet.

Name_____

Address_____

City_____

Acme Radiator Shield Co., Cincinnati, O., has placed R. L. Lingo in active charge of all representative offices and agencies in the east.

Eclipse Fuel Engineering Co., Rockford, Ill., announces that the feed-water regulator department handling the line of McKee automatic feed-water devices has been combined with the gas-fired steam boiler department, with O. N. Sellers in charge. A new division also has been created to be known as the jobbers' service department, which will be devoted to giving technical and engineering information and recommendations to heating men and jobbers of boilers and feed-water devices, with C. G. Soper in charge.

Reed Air Filter Co., Louisville, Ky., has appointed F. A. Sheedy as superintendent; Mr. Sheedy formerly was in charge of the sheet metal and plate works of the Morse Dry Dock and Repairing Company.

Allen & Billmyre Co., Grand Central Palace, New York, manufacturer of turbine pneumatic cleaners, blowers and exhausters, elected J. F. Billmyre as president at a recent meeting of the directors. Hugh V. Conrad, formerly with Ingersoll-Rand Company, was elected vice-president and secretary; Owen S. Lieberg, vice-president in charge of sales; F. A. Dawes, treasurer; W. A. York, assistant secretary and assistant treasurer. Directors, in addition to the officers, are: George B. Compton, Francis M. O'Brien, Herbert Pentz, and Frank J. Dillon. M. Sharaga, formerly with Ratteau, Battu-Smoot Company and General Electric Company, has been appointed chief engineer in charge of design.

Gorton Heating Corp., 96 Liberty St., New York, has appointed B. C. Farra, Room 613, Herald Bldg., Syracuse, N. Y., as sales representative in the northern and western New York territory.

Homer Oil Burner Corp., 60 North Washington St., Boston, Mass., has been purchased by the National Fireworks Distributing Company which will continue to manufacture and sell the Homer oil burner. The original organization has been retained, with the exception of A. P. Homer, vice-president, who has resigned. The manufacturing will be continued at West Townsend, and the sales and servicing will be handled from Boston.

Hamburg Boiler Works, Inc., Hamburg, Pa., has issued a revised list giving prices of vertical tubular boilers from 1½ to 80 H.P.

Southwestern Engineering Corp., Los Angeles, Calif., announces that the ventilating department of the company is operating under the name of the Tiltz Engineering Company, and after September 1, it will not be affiliated in any way. The Southwestern company will continue to manufacture the Collins water tube boiler.

Domestic Stoker Co., 7 Dey St., New York, manufacturer of the Electric Furnace-Man, announces that M. E. Van Vliet, general sales manager, has resigned to become identified with a newly-organized corporation which will distribute the Electric Furnace-Man in Philadelphia, where he resides.

Winslow Boiler and Engineering Co., Chicago, announces the following changes in personnel: Glenn C. Sutton, for eight years sales manager for the Aladdin Company, has joined the organization as a district sales manager. Russell O. Graffius, formerly with the Cornell Utilities Company, is district sales manager in the Philadelphia district; John B. Primrose, who has been associated with the American Nokol Company, now is district sales manager operating around Detroit.

Skinner Bros. Mfg. Co., Inc., St. Louis, Mo., has established factory branches at Cincinnati, O., and Pittsburgh, Pa., from which will be given factory service on apparatus sold. A complete stock of repair parts will be carried at these points for replacements, and also a small stock of heaters for display purposes and immediate delivery.

Mercoid Corp., 564 West Adams St., Chicago, Ill., has appointed J. N. Derby as western manager with headquarters in the Monadnock Bldg., San Francisco, Calif. Mr. Derby formerly covered the northwest territory from the Chicago office.

Stanwood Corp., Cincinnati, O., has established a New York office at 1362 Hudson Terminal Bldg., 50 Church St. A. Ransom, P. O. Box 306, Wheeling, W. Va., has been appointed sales representative in the Wheeling territory for Stanwood products, including smokeless, steel-riveted boilers and horizontal return-tubular boilers.

Milwaukee Valve Co., Milwaukee, Wis., has established a San Francisco office and warehouse at 307 Minna St., with Clarence Drucker in charge. A complete stock of Milvaco heating specialties and standard valves will be maintained at this warehouse.

American Radiator Co., 40 West 40th St., New York, has purchased the office building in the rear of its own building at 35-37 West 39th Street. The company will connect the two buildings by a bridge and some of its departments will be housed in the new addition. Another new sales office and branch has been established at 164-01 Hillside Ave., Jamaica, Long Island, N. Y., with J. E. Noonan, formerly at the company's main office, as manager in charge.

Wolff Co., Chicago, has appointed the following sales representatives: H. H. Hegeman will cover eastern Ohio, western New York and western Pennsylvania, with headquarters at Pittsburgh, Pa.; W. B. Campbell, will represent the southern territory, with headquarters in Nashville, Tenn.; George W. Knott, with headquarters in the general offices at Chicago, will supervise sales in Wisconsin, eastern Minnesota, Iowa and northern Illinois.

Electrol Distributing Corp., of New York, held its annual sales and engineering convention at Lake Bomoseen, Vt., July 2-11, at which 82 dealers and sales and service men were present. During the first two days merchandising topics were discussed, and the last days were devoted to a mechanical school.

York Heating and Ventilating Corp., Philadelphia, Pa., announces that Paul Campbell has joined the company as plant manager and will be located at the factory at Bridgeport, Pa. Mr. Campbell formerly was associated with the Electric Service and Supplies Company, and the F. B. Stearns Company. Another appointment is that of Herman C. Kappler as educational director, a newly created position, to take charge of the school of training new salesmen entering the organization. Mr. Kappler was an instructor at the University of Michigan and recently with the engineering staff of Smith, Hinchman & Grylls, of Detroit. C. R. McConner, formerly district manager of the Clarage Fan Co., Chicago, has been appointed manager of the company's district office in Detroit.

Changes of Address

American Radiator Co., New York, announces the removal of its Kansas City, Mo., branch office to new quarters at 1423 Baltimore Avenue. A showroom occupies the front of the building and in the rear are the general offices and private office of the manager, F. F. Dodds. M. F. Stack, formerly of the St. Louis branch, has been appointed assistant manager.

The company also has opened new showrooms and display headquarters at 1206 Fifth Ave., Seattle, Wash., with F. X. Urquhart as local manager.

Ruud Mfg. Co., Pittsburgh, Pa., has moved its Minneapolis, Minn., branch from 93 South 11th Street to 900 North 4th Street. M. L. Johnson is in charge of this office.

Grant Home Heater Corp., 2 Rector St., New York, announces the removal of its New York office and demonstrating rooms to the factory at 123-127 Montgomery St., Jersey City, N. J.

New Economy in Unit Heating!

Motor horse-power cut 50% — current consumption halved — through the use of propeller type instead of centrifugal type fans!

TO equip this new Sturtevant Unit Heater with propeller type fans seemed to be plain common sense . . .
for propeller fans operate at highest efficiency against low resistances . . .
whereas housed centrifugal fans operate at lowest efficiency against low resistances . . .
and the resistance offered by the Aerofin heating element in the Sturtevant Unit Heater is *low*.

Tests were made in the Sturtevant Research Laboratory—undoubtedly the most thorough and accurate unit heater tests ever conducted Both types of fans were tested under actual unit heater operating conditions. Exacting standards established by the heating and ventilating societies and committees were used.

Sturtevant Tempervane heating unit, overhead type

Result: — Sturtevant Tempervane Heating Units are equipped with *propeller type fans*—for any given air delivery or B. T. U. capacity, the motors required are half the horse-power of those used on similar units equipped with housed centrifugal type fans—current consumption cut 50%!

Investigate this decidedly worth while unit heating economy. Write our main office below and complete information will be promptly furnished.

Tempervane Heating Units are made in both floor and overhead types, for steam pressures up to 350 pounds per square inch.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.
Branch Offices in Principal Cities

Sturtevant REG. U.S. PAT. OFF. *Tempervane* **Heating Units**

Classified Advertising

Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisement contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

MANAGER WANTED—Company furnishing a million dollars' worth of standardized equipment to the heating industry yearly, desires to procure a manager with an aquaintanceship in the heating industry who has had experience in merchandising and sales work and is familiar with steam circulation. The position would call for taking charge of sales, advertising, collections, etc., and the handling of ten salesmen doing a national business. Company is progressing and growing. Good opportunity for the right man with the right kind of ability. Salary from $8000 to $10,000. Address Box 322, Elizabeth, N. J.

POSITION WANTED — Selling engineer, twelve years' experience, lay-out, specification, installation, supervising, estimating and sales. Available August 15. Present location Chicago; will consider office elsewhere. Have traveled and familiar with central west territory. 34 years old, married, responsible. Address Box 91, care of Heating and Ventilating Magazine.

ENGINEER WANTED—Position open for an experienced heating engineer with a successful piping contractor located not far from Boston, Mass. Must be capable of taking charge of several draftsmen and be willing to work on drawing-board when necessary. When writing, give age and experience. Address Box 92, care of Heating and Ventilating Magazine.

MANUFACTURER'S REPRESENTATIVE—Manufacturer of complete line of fans, air washers and unit heaters, desires recognized representative on commission basis. Address Box 93, care of Heating and Ventilating Magazine.

FOR SALE CHEAP—Niagara Boiler No. 806—S-2000' and a Williams Oil-O-Matic Burner. Complete. Used one season, can be seen at Frank P. Bauer Marble Co., 4330 Melrose St., Chicago, Ill.

SALES ENGINEERS WANTED

One of the oldest, largest and most reputable concerns in the United States, manufacturing heating specialties for vacuum and vapor heating systems, has territory available for competent organization or engineering salesmen who are well established and financially responsible. The products of this company are nationally advertised, the line is complete and offers unlimited possibilities to capable representatives. Some territory will be new, some is territory now covered where a change will be made and includes some of the large metropolitan centers. Consideration will be given only to those fully meeting qualifications, and all replies will be treated strictly confidential. Address Box 94, care of Heating and Ventilating Magazine.

BETTER TECHNICAL TRAINING MEANS A BETTER JOB

Warren Heckbert, of San Diego, writes us the following: "Your course has no equal. The little studying I have done has helped me to get a new and better job." St. Louis Technical Institute has successfully helped Warren Heckbert and hundreds of others in their climb to the top, and we can do the same for you if you accept our training. For 18 years, St. Louis Technical Institute has specially prepared men for promotion that was as certain as it was deserved. Our students enjoy the best of pay, steady employment, better technical knowledge. You, too, can enjoy the same success if you subscribe to St. Louis Technical Institute engineering courses. Check the subject that interests you and send for full free information without any obligation.

- ☐ Heating and Ventilating Engineering.
- ☐ Special Steam and Water Heating.
- ☐ Scientific Warm Air Heating.
- ☐ Plumbing and Sanitary Engineering.
- ☐ Contracting and Estimating.
- ☐ Mechanical Drafting.

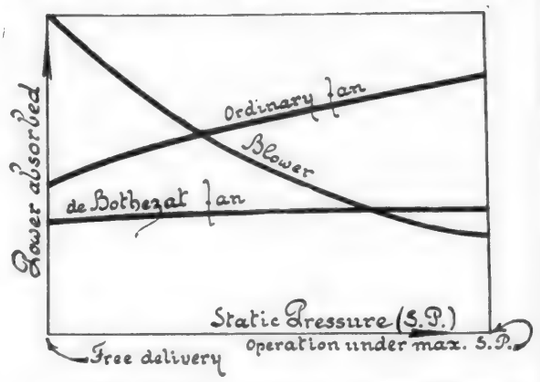
Saint Louis Technical Institute
Est. 1910
The most thorough institution for Technical Home Study to-day.
4543 Clayton Avenue St. Louis, Mo.

SALES REPRESENTATIVES WANTED—Old established company, manufacturing high-grade vapor heating specialties, has some territories open, particularly in the West and South. This is the easiest system to sell as it is the only true single-pipe vapor system with consequent saving in installation cost. Commission basis. Lay-outs not necessary. State territory and other lines handled. All communications held strictly confidential. Address Box 95, care of Heating and Ventilating Magazine.

A Fundamental Fact About Fans Disclosed

Diagram illustrating the *non-overloading power characteristic* of De Bothezat Disc Pressure Fan

The diagram gives the power curves plotted against static pressure for three different types of fans.



FOR THE ORDINARY DISC FAN: The power increases as the pressure increases. **FOR THE BLOWER:** The power decreases as the pressure increases. **FOR DE BOTHEZAT DISC PRESSURE FANS:** *The power is practically constant under any pressure from free delivery to no delivery.* Thus:

FOR THE ORDINARY FAN: The motor may be overloaded and may burn out if the static pressure increases (for example a wind blowing against the fan).

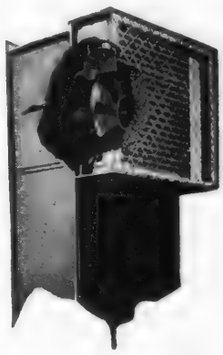
FOR THE BLOWER: The motor will overload and may burn out if the static pressure decreases (for example a leakage in the ducts).

FOR THE DE BOTHEZAT DISC PRESSURE FAN: *The power remains practically invariable under any pressure. This fan will never overload the motor. It is the ideal fan to be used with complete safety under any conditions.*

DE BOTHEZAT IMPELLER CO., Inc.

1922 Park Avenue, New York City

HEAT WITH UNIT HEATERS



SELL AND INSTALL

the VENTURAFIN
TRADE MARK REGISTERED
METHOD OF UNIT HEATING

For Stores, Offices, Garages, Factories, Shops and countless other installations

The Venturafin Method of Unit Heating enables you to simplify the task of bidding—cut your hauling and installation costs—eliminates a great deal of piping—reduces the number of joints required—and enables you to handle more jobs with a quicker turnover and fewer employees.

From the user's standpoint the Venturafin Method of Unit Heating furnishes comfortable temperatures at low costs, occupies less floor space and requires less attention, gives better heat distribution and more perfect control of temperature.

Heating and ventilating engineers write for details.
Heating contractors send for our latest sales plans.

AMERICAN BLOWER CORPORATION, DETROIT, MICHIGAN
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONT.
BRANCH OFFICES IN ALL PRINCIPAL CITIES

(788)

American Blower

"Sirocco" VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT
MANUFACTURERS OF ALL TYPES OF AIR HANDLING EQUIPMENT SINCE 1881

These Modern Buildings are draft-proofed

A FEW PROMINENT BUILDINGS ATHEY-WEATHERSTRIPPED
THERE ARE HUNDREDS OF OTHERS ALL OVER THE U. S. A.

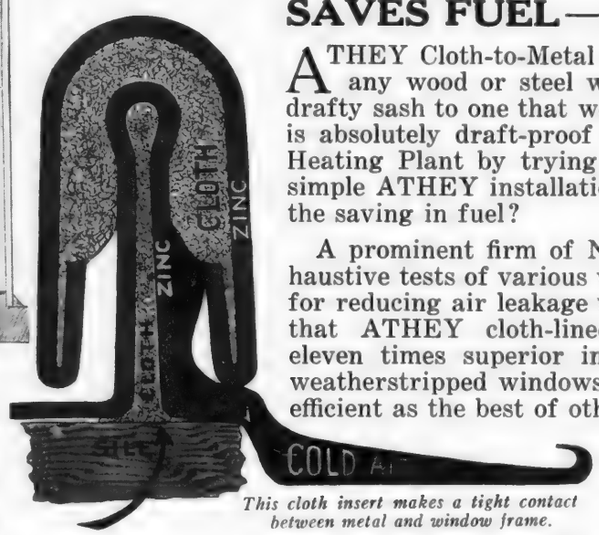
Right now is the time

to draft-proof Buildings for the coming cold Winter. It is a profitable investment that pays more than 33% dividends annually for the life of the building.

SAVES FUEL—ADDS COMFORT

ATHEY Cloth-to-Metal contact weatherstrips change any wood or steel window from a rattling, loose, drafty sash to one that works smoothly and quietly and is absolutely draft-proof when closed. Why force the Heating Plant by trying to heat all outdoors when a simple ATHEY installation quickly pays for itself with the saving in fuel?

A prominent firm of New York architects made exhaustive tests of various well known mechanical devices for reducing air leakage through windows. They found that ATHEY cloth-lined metal weatherstrips were eleven times superior in reducing leakage over non-weatherstripped windows and more than four times as efficient as the best of other installations.



This cloth insert makes a tight contact between metal and window frame.

ATHEY WINDOW SHADES

are more than the most beautiful shade obtainable and long life is not the only economy. They eliminate the necessity of awnings and are better because they can instantly be adjusted to shade any part of the window, still allowing light to enter at the top. These attractive shades have proved, in hundreds of prominent buildings, their unusual durability and dust and dirt-repellent qualities, besides their freedom from annoying catches and springs.

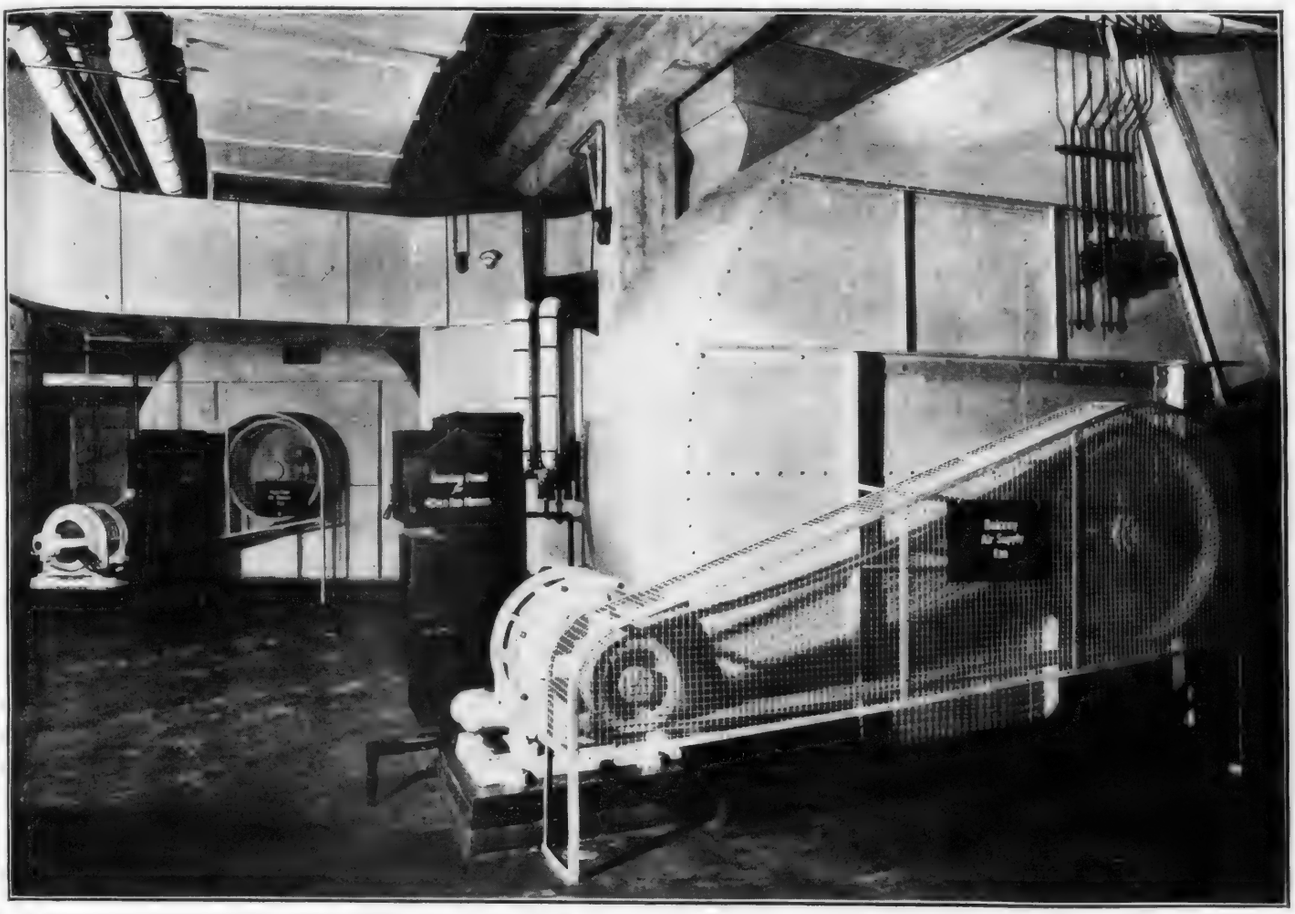
Send for this New Athey Book

It contains valuable information for any building owner or manager, architect or engineer, desiring to save fuel, prevent drafts and increase comfort.

Athey

CLOTH LINED METAL WEATHERSTRIPS and PERENNIAL WINDOW SHADES

ATHEY COMPANY
6097 West 65th St., CHICAGO
Representatives in all Principal Cities and in Canada



"Buffalo" Air Washers and Ventilating Fans in the elaborate new Portland Theater, Portland, Oregon

Better Ventilation for Better Buildings

THERE is a final touch of perfection for the finest building. Fresh, pure, properly tempered air.

Carrier Air Washers and "Buffalo" Fans are supplying this finishing touch to many of America's finest structures. Schools, theatres, public buildings, art galleries, libraries, museums, offices, banks, industrial plants and many other buildings are ventilated by the system that actually washes the air—Carrier—and the fans that are quiet and long lived.

If you are interested in the latest improvement in Air Washers and Humidifiers, write for a free copy of our new catalog, No. 480.

Buffalo Forge Company

480 Broadway Buffalo, N. Y.

In Canada—Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

1878 "Buffalo" 1928 — "Air Engineers for Fifty Years"

This is Our Idea of an Efficient Indirect Heater —do you agree with us?

—*uniform pipes:* of precisely the same length and built in precisely the same way.

—*no short circuits:* flow of steam, air and water always in one direction; no opposing counter currents. Circulation being free and positive every square foot is prime heating surface.

—*expansion:* no racking by expansion and contraction each pipe being separate and independent. No rigid connections, return bends, nipples or elbows to be racked out of shape.

—*connections:* steam and drip connections very simple. No double decking with double steam and return connections required to obtain necessary heating area.

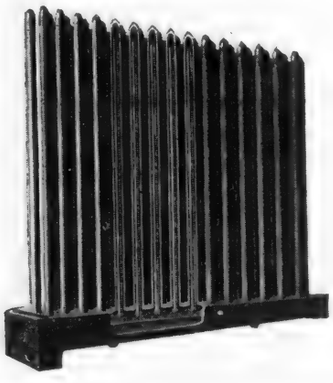
—*ample steam supply:* operates efficiently on either low or high pressure.

—*efficient regardless of position* — base horizontal, pipes vertical or pipes horizontal base vertical, or base and pipes flat.

—*all pipes wrought steel* — rust and corrosion proof.

—*can be shipped knocked down* — eliminating handling and erecting of heavy, bulky units.

Bayley Chinook Heater—the most improved form of indirect Heater. Construction is such that there are no return bends, elbows or nipples. Permits use of steam at either high or low pressure.



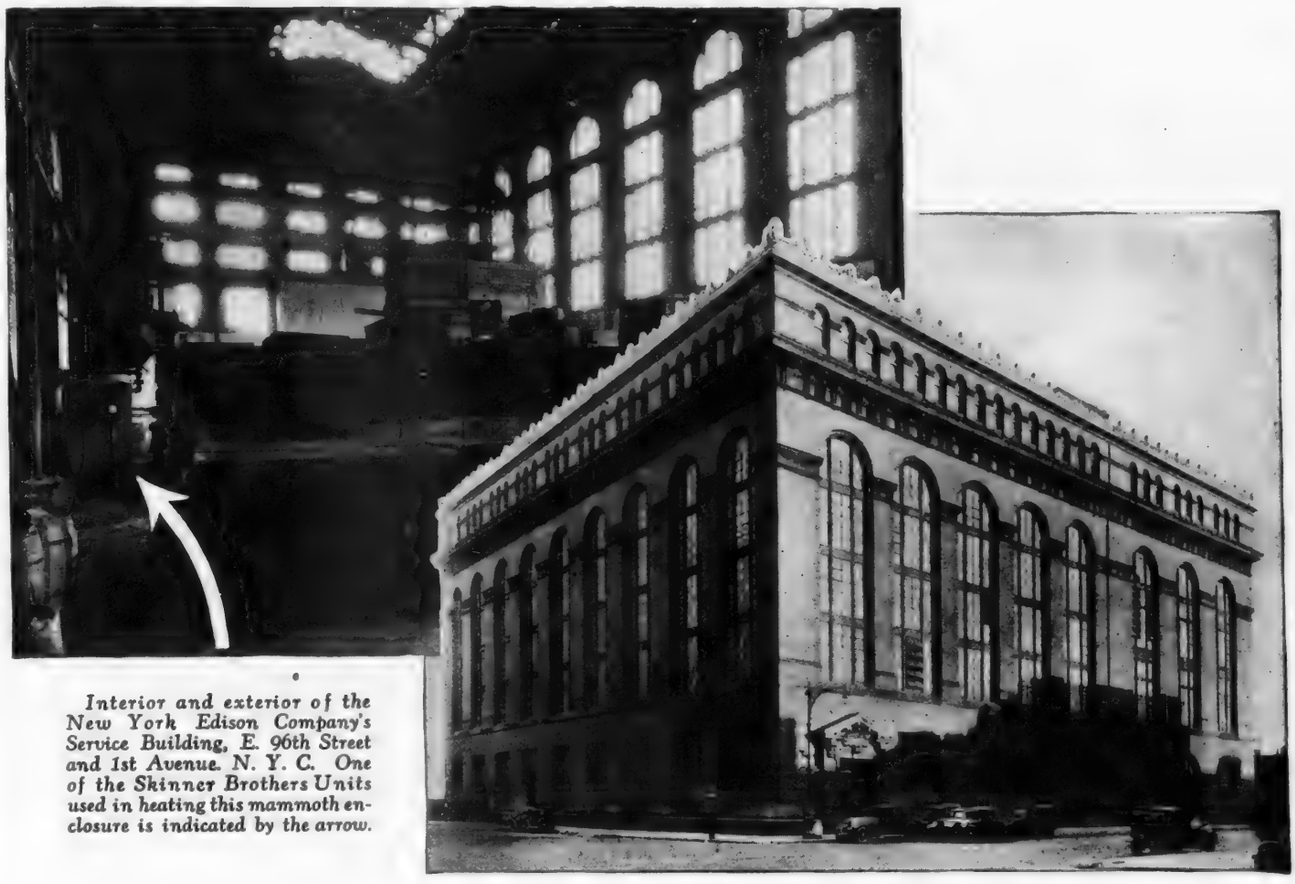
That briefly is the Bayley concept of an efficient indirect heater and the manner in which the Bayley Chinook Heater is built. Many installations have proven it successful. May we tell you where they are and state the argument more fully by means of our Bulletin No. 30?

BAYLEY BLOWER COMPANY
742 Greenbush Avenue Milwaukee, Wisconsin

Bayley

AIR ENGINEERING & EQUIPMENT

HEATING AND VENTILATING
AIR WASHING AND HUMIDIFYING SYSTEMS
MILL EXHAUSTERS—PRESSURE BLOWERS
MECHANICAL DRAFT FANS
AIR AND GAS SCRUBBERS
INDUSTRIAL DRYING SYSTEMS



Interior and exterior of the New York Edison Company's Service Building, E. 96th Street and 1st Avenue. N. Y. C. One of the Skinner Brothers Units used in heating this mammoth enclosure is indicated by the arrow.

The New York Edison Company chose Skinner Heating because they know it is

True *Work-area* Heating

They chose Skinner Heating, *not* because this company originated the unit method; *not* because of its 34 year accumulation of heating experiences—

They chose it because they *know* that in thousands of cases Skinner (Baetz Patent) Heaters have demonstrated their ability to do a *better* job of keeping heat in the *work-area.*

Skinner Heaters can do this because their operation follows a simple physical principle. A Skinner man's explanation of that principle will soon convince you that Skinner Heaters can heat the *work-area* in *your* plant *better* and with *less waste* of valuable B. T. U's in the unused spaces overhead.

Call in a Skinner Sales-engineer. You will find his thorough training has fitted him to discuss your heating problems intelligently and helpfully.

Skinner Brothers Mfg. Co. Inc.

1470 S. Vandeventer St. Louis, Mo.

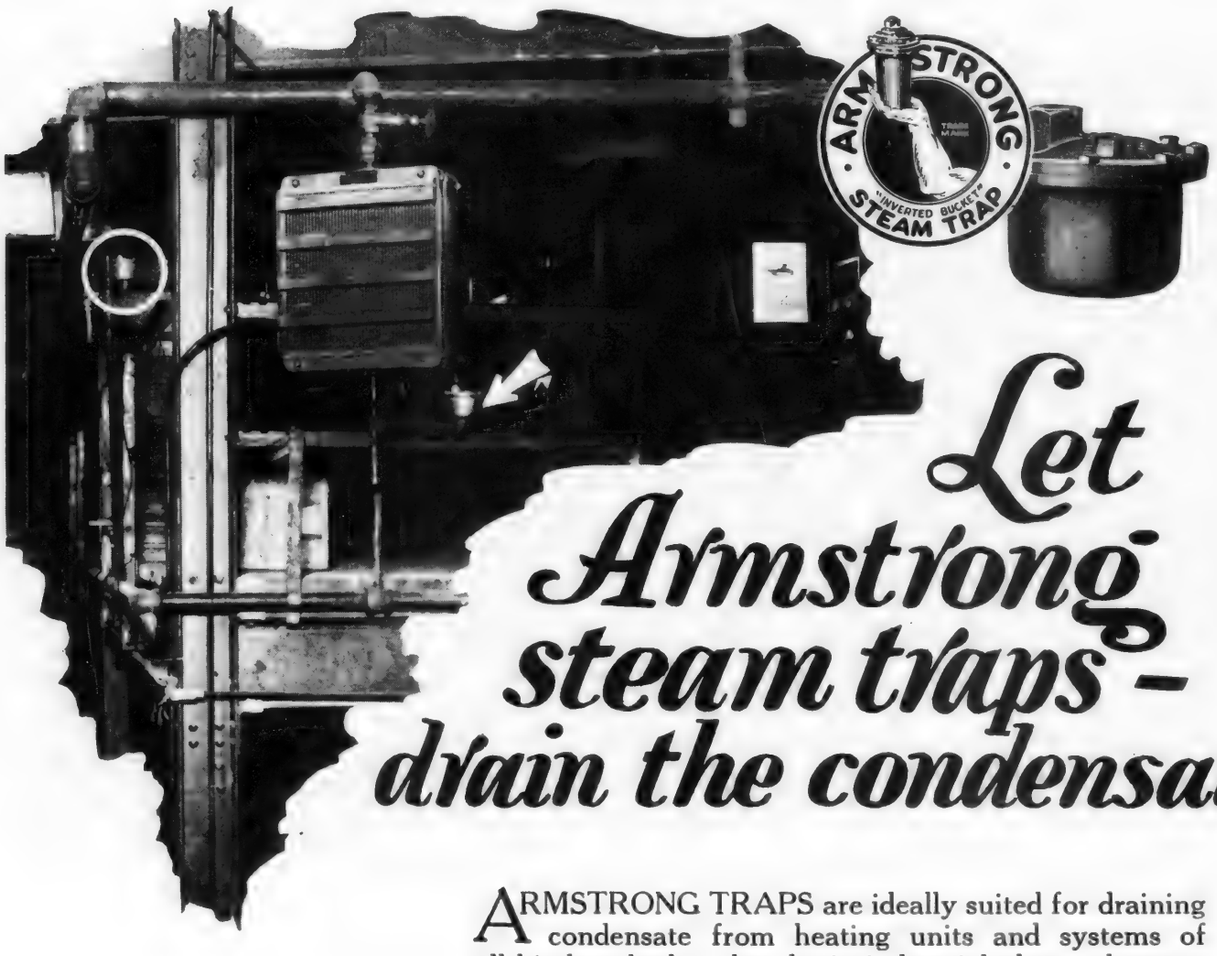
work-area Heating

New York Office 1710 Flatiron Bldg.

Branches in 30 principle cities

H8

Originators of the Unit Method of *work-area* Heating



Let Armstrong steam traps – drain the condensate

ARMSTRONG TRAPS are ideally suited for draining condensate from heating units and systems of all kinds, whether they be in industrial plants, theaters, public buildings or private homes.

For maximum heating efficiency it is necessary to keep air and water out of the steam headers and the heating units. Armstrong traps do it automatically and dependably. They are self-cleaning, discharging dirt and scum with the condensate. Armstrong Traps are water-sealed, at all times precluding the escape of live steam. The unique construction gives a large capacity for a small size. Because of their small size their cost is low and installation is a simple matter. No special fittings or supports are necessary. The sturdy construction and special wear-resisting parts insure long life and a minimum of maintenance.

Thousands of Armstrong Traps which have been in use for several years are giving excellent service without any attention.

ARMSTRONG MACHINE WORKS

346 Maple Street, Three Rivers, Michigan

District Representatives in 36 Cities

H & V9-Gray

If They Illuminated Plants as They Once Had to HEAT Them

Here's the way the Modine Unit Heater circulates heated air down to the working zone and keeps it there.

Course of heated air circulation with cast iron radiation or pipe coils.

The new way of heating that Modine introduced

HOW ridiculous the picture looks — all the light at the roof — working area a twilight zone.

But, notice the heating coils. The heat waves are roof-ward bound.

It is just as unreasonable to waste your light at the roof as it is to waste heat with old-fashioned equipment.

For you now can direct heat almost as effectively as light is directed. The Modine Unit Heater does this. Suspends from the steam line. Delivers heat down to working level and keeps it there. Spreads heat over a wide floor area. Produces a new degree of comfort for factory workers—warm floors, uniform temperature. Control of heat flow is instantaneous. Each Modine operates independently.

If you're installing a new heating system, if you're repairing or supplementing your old one, get complete facts now about the Modine Unit Heater. A Modine Unit Heater installation costs less than cast iron radiation. And it insures better and more economical heating for your plant.

Modine Unit Heater No. 701 — weighs only 125 lbs., and has the heating capacity of nearly 2 tons of cast iron radiation.

MODINE MANUFACTURING COMPANY, (*Heating Division*)
1707 Racine Street, Racine, Wis.
Branch Offices in all large cities. LONDON OFFICE: S. G. LEACH & CO. Ltd., 26-30 Artillery Lane

Modine *Unit* HEATER

A MODINE Product

FOR STEAM, VAPOR, VACUUM, HOT WATER HEATING SYSTEMS

Shunt Steam Meters are in Use by a Variety of Industries

Industry promptly responded to the announcement of a low-priced meter for steam, air, and gas lines. As a result Shunt Meters are already in use serving

OIL REFINERS
CHEMICAL COMPANIES
HARDWARE MANUFACTURERS
MEAT PACKERS
DAIRIES
COLLEGES
RAILROADS
STEEL MILLS
PAPER MILLS
TEXTILE MILLS
RESTAURANTS
HOTELS
CENTRAL STATIONS
DISTRICT HEATING COMPANIES
NEWSPAPER PUBLISHERS
REFRIGERATION PLANTS
MINING AND SMELTING PLANTS
MOTOR MANUFACTURERS
OFFICE BUILDINGS (selling steam to tenants)
TESTING LABORATORIES
GAS COMPANIES
ETC.

A considerable number of the Shunt Meters sold to the industries listed above were purchased for use on heating lines. Wide range of accuracy, ease of installation, low first cost and practically no upkeep expense are reasons why these Meters are well suited for such use.

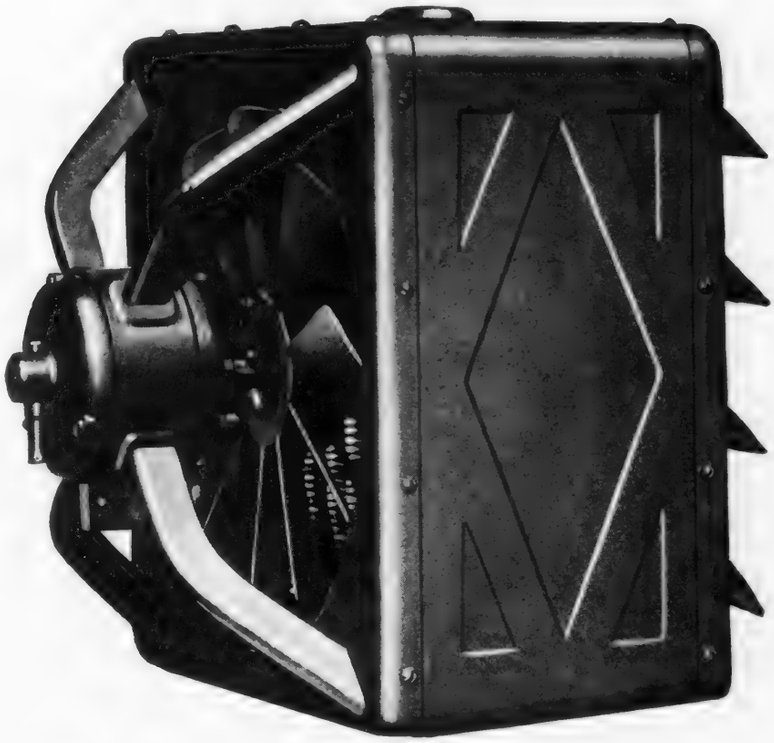
Bulletin No. 234 is brief but complete. Even if you have no present need for steam or air meters we want you to have this bulletin on file. Just send us your address.

BUILDERS IRON FOUNDRY

"Builders of the Venturi Meter for 36 years"

11 Codding Street **Providence, R. I.**

"Heat with Unit Heaters"



For Flexible and Economical Heating—

Because of their flexibility, **Comet Unit Heaters** are ideally adapted to many types of buildings. They ventilate as well as heat. Cheaper to install than direct radiation and cheaper to operate. . . . .

Air bound pounding, waterlogging or freezing will not affect the Comet Unit Heater with its sturdy, welded construction. The core contains no cast, soldered or brazed materials. Every one is tested under hydrostatic pressure and guaranteed to withstand unlimited steam pressure.

Comet Unit Heaters will also resist rust, corrosion and oxidation for the *lifetime of the entire heating system.*

The scientific design and construction of the tubes give an unusually large heating surface.

Comet Unit Heaters are furnished in both overhead and floor mounted types in several sizes to meet every building requirement.

Write for Bulletin No. 105 giving guaranteed capacities

Fans—Blowers
Unit Heaters
Air Washers
Furnaces

NEW YORK BLOWER COMPANY

General Offices
3151 Shields Avenue
Chicago, Ill.

REPRESENTATIVES IN PRINCIPAL CITIES

The KAINER PRESSURE GOVERNOR

FOR HOT WATER HEATING SYSTEMS

Sensitive —

as the Blacksmith's Bellows

The Bellows Diaphragm—an exclusive feature of the KAINER PRESSURE GOVERNOR is extremely sensitive, responding instantly to the slightest changes in pressure. As shown above, it is used in both the pressure reducing and relief units.

The KAINER PRESSURE GOVERNOR attaches to any hot water heating system in a few minutes; is located where it is easily accessible, completely eliminates the need of an expansion tank.

Safe, Simple, Economical and a real profit producer for you.

KAINER & COMPANY
CHICAGO
761-763 Mather Street
Manufacturers of Plumbing and Heating Specialties

Successful Experience

The PeerVent Heating and Ventilating Unit of today is a remarkable machine. The results of 38 years' experience are centered in this Unit. It includes all the sound engineering principles of earlier PeerVent types, plus improvements in almost every detail of the Unit. And every improvement is based upon practical experience, not mere theory; for the Peerless Unit Ventilation Company was the pioneer manufacturer of Heating and Ventilating Units. Units built by this Company *fifteen years ago* are still in service and are giving perfect satisfaction.

This Company offers prospective purchasers two important advantages: (1) A unit which is long past the experimental stage. (2) A thoroughly experienced organization.

Write for Booklet on the Unit System of Heating and Ventilating; or, on request, we will send our local representative.

PEERLESS UNIT VENTILATION CO., INC.
718-34 Crescent Ave. - - - - Bridgeport, Conn.

Selling Agents in Principal Cities From Coast to Coast

PEERVENT

HEATING AND VENTILATING UNITS

THE HYDROSTATIC DISTANT READING GAUGE

Approved by Underwriters' Laboratories

Protect Your Oil Burner Installation Against Future Trouble

NO oil burner installation is really complete until the tank is protected by a K-S Telegage. To leave it off is simply to invite trouble. In domestic installations, an empty fuel tank at a critical moment means serious discomfort—perhaps illness. In larger installations, such as apartment houses, hospitals, factories, etc., an empty tank may mean a loss of thousands of dollars. The K-S Telegage has proven a timely safeguard against this form of trouble.

The K-S Telegage tells at a glance the actual depth of liquids in storage tanks. Placed at any point near or far from the tank, this precision instrument guards fuel oil and all other kinds of liquid storage against checking errors and costly failures. It shows when a new supply of fuel oil or other liquid is needed, and exactly how much.

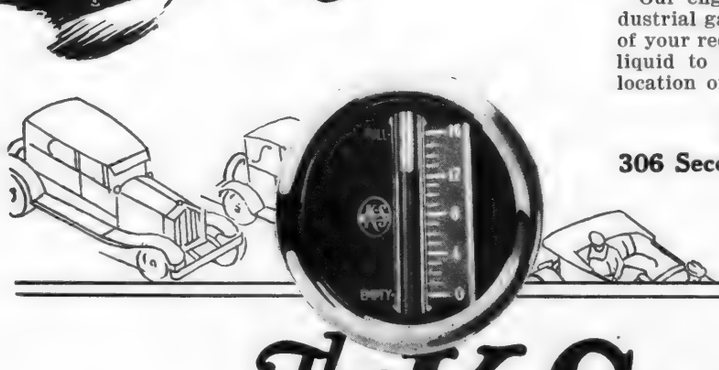
Water, oils, chemicals, gasoline, fuel oil, finishing materials, etc., are a few of the many industrial fluids stored in tanks and guarded by the K-S Telegage. The reliability of the Telegage is assured by the fact that it is a product of the world's largest maker of distant reading gauges.

Our engineering department will be pleased to discuss any industrial gauge problem, if you will write giving a full description of your requirements. Give the Baume or Specific Gravity of each liquid to be measured and the distance from tank to desired location of gauge. Descriptive folder sent on request.

KING-SEELEY CORPORATION

306 Second Street **Ann Arbor, Michigan**

Branch Offices:
New York—44 Murray Street
Chicago—472 Wrigley Building



The K-S Telegage

BE CERTAIN WITH THE *K-S TELEGAGE*

Standard factory equipment on three-fourths of all cars selling for $700 or more.

These Are the Reasons—

Why Wing Featherweight Unit Heaters More than fulfil your Specifications!

1. *Heat delivered immediately to the working area.*

Wing Featherweight Unit Heaters withdraw overhead air, reheat it, and deliver it directly to the working level—thus putting comfort where it is wanted.

2. *Prevention of heat-accumulations under the roof.*

Because of the action described above, Wing Featherweight Unit Heaters prevent heat from collecting in the upper spaces by withdrawing warm air as fast as it gathers, and re-delivering it, heated, to the work floor.

3. *Uniform heat distribution through multiple discharge outlets.*

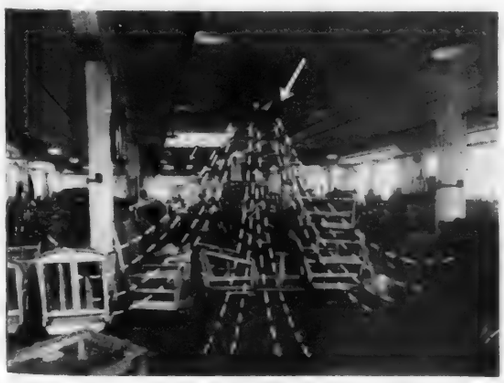
Discharging heated air through several outlets at the proper velocity, Wing Featherweight Unit Heaters spread a uniform blanket of warm air about the working zone.

4. *Floor and wall space free and clear.*

Preserving all floor space for production purposes and clearing side walls of all light-obstructing equipment are other big advantages resulting from the overhead position of Wing Featherweight Unit Heaters.

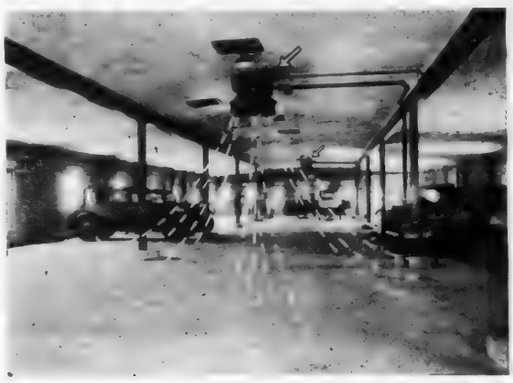
Get Wing Heater Bulletin for Complete Information

L. J. Wing Mfg. Co. 158 West 14th Street, New York

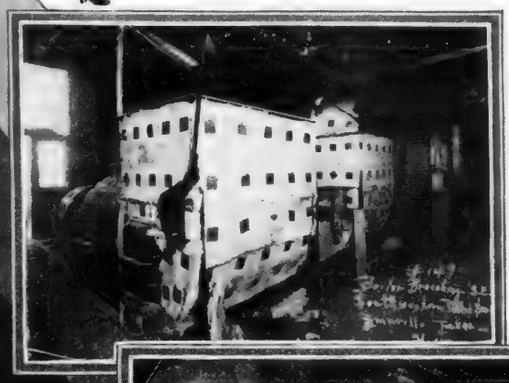


These views show the efficient action of Wing Heaters in spreading warm air about the working level, without perceptible air movements.

HEAT with Unit Heaters



Mr. B. T. U. Says:—"Difficult Insulation Jobs are made easy with Banroc Jacket"



NO insulating job is too difficult for BANROC Insulation. The very nature of the material is such that it is particularly adaptable for the *difficult* jobs.

Take the insulating of curved expansion ducts in boiler breechings, for instance. The irregularity of the expansion and contraction makes necessary a flexible insulating material which absorbs this action without cracking, or loss of efficiency.

At the left is an installation of this kind in the power plant of the Southwestern Public Service Co., at Amarillo, Texas, showing the method of applying BANROC JACKET, and the finished job.

Your insulating problems interest us. There is a BANROC representative near you to help solve them. Call him in for free consultation.

BANROC INSULATION

Banner Rock Products Co.
Alexandria, Indiana

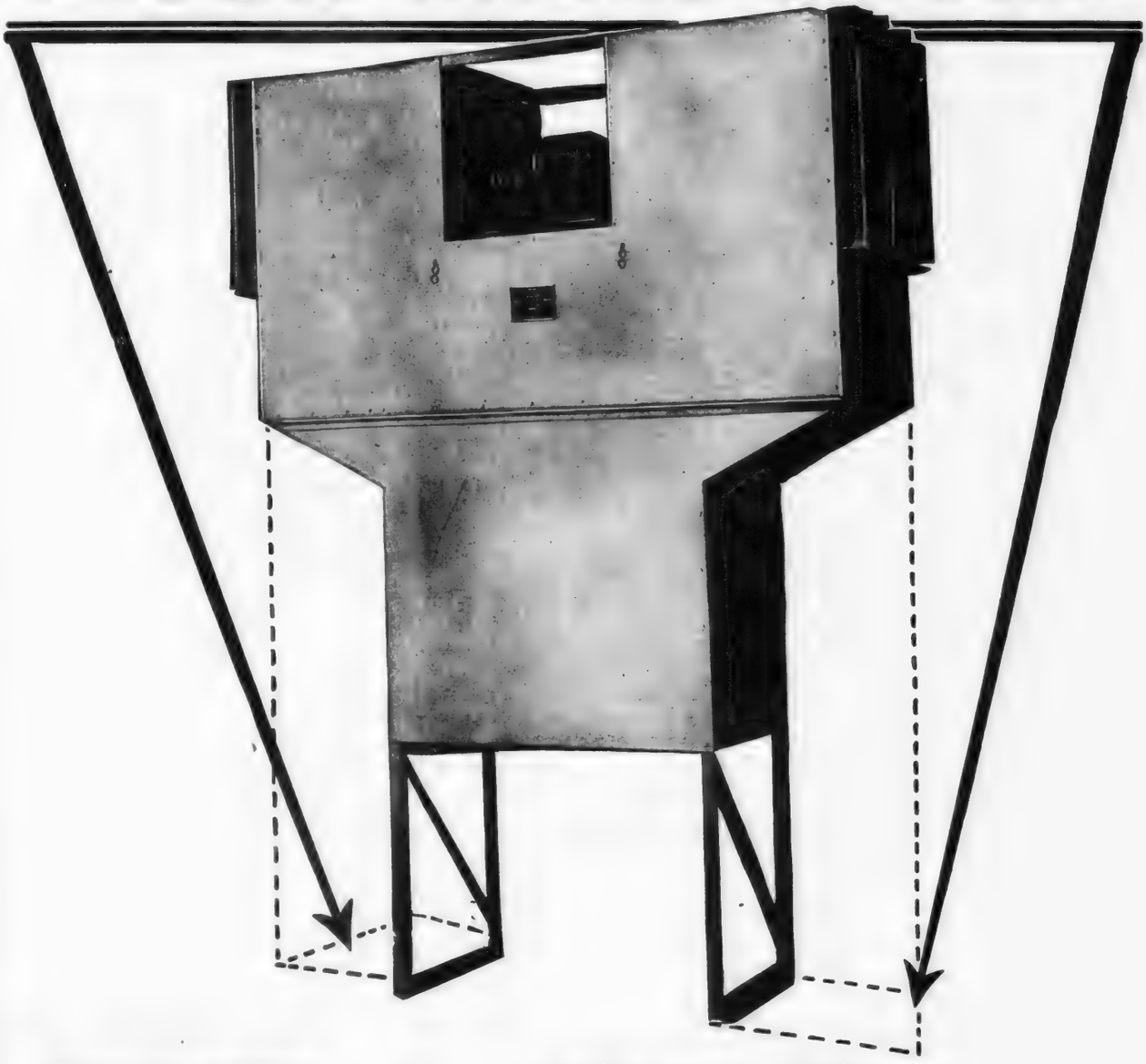
Originators of Rock Wool Products

Consult the 'phone directory in the following cities for a BANROC Representative:

BOSTON
NEW YORK
BUFFALO
NEWARK
DENVER
PHILADELPHIA
PITTSBURG
CLEVELAND
TOLEDO
DETROIT
LOS ANGELES
CHICAGO
ST. LOUIS
SAN FRANCISCO
HOUSTON
TULSA

SOUTHWESTERN PUBLIC SERVICE CO. – AMARILLO, TEXAS
DAY AND ZIMMERMAN, ENGINEERS

FLOOR SPACE SAVED



A Striking example of Refinement in

TWINFAN Unit Heater Design

The illustration plainly shows the reduced floor space occupied by the improved TWINFAN Unit Heater. The base construction has been reduced to the smallest possible size, consistent with an air inlet of ample area.

The improved TWINFAN Unit Heater features many other refinements as important as this one of floor space saved.

Our Bulletins Nos. 201 and 202 describing these refinements are yours on request.

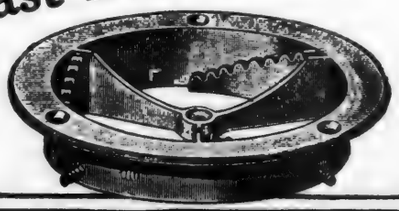
DWYER EQUIPMENT CO.

4534 W. NORTH AVE. CHICAGO, ILL.

HEAT WITH WINFAN UNIT HEATERS

in Cast Iron

The Leader is



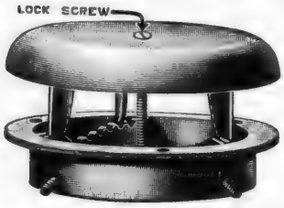
View of Bottom Casting

Nu-Notch

REG. U.S. PAT. OFF.

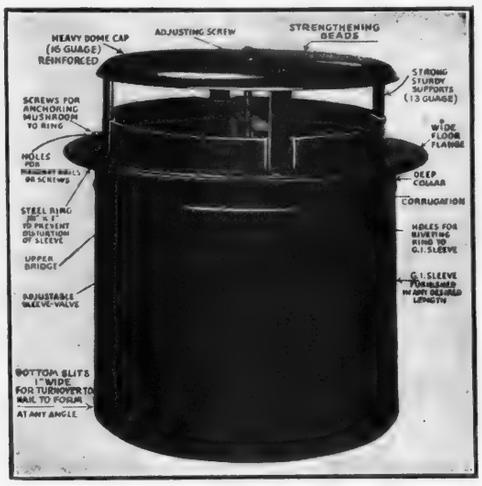
MUSHROOM VENTILATOR

Preferred by architects and engineers because it is Simple, Rigid and easily adjusted in RECESSED NOTCHES that assure permanent adjustment. Can be used for any kind of floor. Also flat tops for low seats and steel ring for sleeve.



in Steel MUSHROOM AEROVALVE AIR DIFFUSER

Made of Heavy Steel


HEAVY DOME CAP (16 GUAGE) REINFORCED
ADJUSTING SCREW
STRENGTHENING BEADS
STRONG STURDY SUPPORTS (13 GUAGE)
SCREWS FOR ANCHORING MUSHROOM TO RING
WIDE FLOOR FLANGE
HOLES FOR
DEEP COLLAR
CORRUGATION
STEEL RING TO PREVENT DISTORTION OF SLEEVE
HOLES FOR RIVETING RING TO G.I. SLEEVE
UPPER BRIDGE
G.I. SLEEVE
ADJUSTABLE SLEEVE-VALVE
BOTTOM SLITS 1" WIDE FOR TURNOVER TO NAIL TO FORM AT ANY ANGLE

Stronger than cast iron; will sustain many times the weight to which it is ever subjected. AEROVALVE is quickly installed, easy to regulate, and low in price. Sold with or without sleeve.

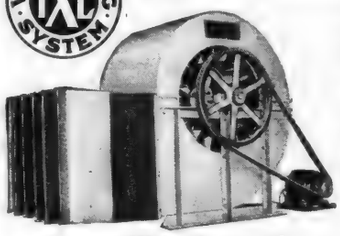
Made by the makers of the DISC-LOC Gallery Riser Vent and the TU-WAY Air Deflector

KNOWLES MUSHROOM VENTILATOR CO., 202 Franklin St., New York City

Lakeside

VENTILATING IXL SYSTEM

Quiet *Electric Ventilator*



An electric ventilator that fills a long felt need—efficient and quiet in operation.

Easy to install—requires no tearing down of walls or ripping of floors.

Write for catalog.

LAKESIDE COMPANY, 107 Main St., Hermansville, Mich.

CONTROL THE SPEED

OF YOUR VENTILATING EQUIPMENT!

REGULATE WARM AND COLD AIR VOLUME

WITH THE TIME TESTED

HORTON

VARIABLE SPEED

PULLEY

HORTON MANUFACTURING COMPANY

3008-3016 University Avenue S.E. Minneapolis, Minn.

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American Foundry & Furnace Co., St. Paul

MANUFACTURED WEATHER

Carrier AIR CONDITIONING AND DRYING EQUIPMENT

makes

"Every day a *good* day"

Air Conditioning

Humidification, Dehumidification
Centrifugal Refrigeration
Cooling of Public and Industrial Buildings
Temperature and Humidity Control

DRYING AND PROCESSING

Carrier Engineering Corporation

Offices and Laboratories

NEWARK, NEW JERSEY

SALES OFFICES

New York Philadelphia
Boston Chicago
Cleveland
Los Angeles
Kansas City
Washington

See our detailed data in A. S. H. & V. E. Guide.

Literature on request. Write concerning your specific problem.

Built to be more than "quiet"

ENGINEERS and architects expressed a need for a unit ventilator that would be more than "quiet" in operation—a unit ventilator which they could install, confident that it would run so silently that the occupants of a schoolroom, church or office would be unable to detect its operation.

Sturtevant Engineers set out to build such a unit ventilator. In the Sturtevant Research Laboratories, where ventilating equipment has been evolved to meet the demands of the greatest projects in air engineering, the work was begun. Designs were made—revised—made again. Countless experiments were conducted. Special motors and fans were developed. Finally, the "Silent" Sturtevant Unit Ventilator was produced.

As many installations of the "Silent" Sturtevant have already been made, the nearest Sturtevant representative will gladly take you to a local installation where you can observe this equipment in operation. You will then know why it meets the most exacting requirements for quietness and efficiency.

Bulletin 344-A explains the equipment in detail. Let us send you a copy.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

Atlanta	Camden	Cleveland	Detroit	Los Angeles	New York	St. Louis
Birmingham	Charlotte	Dallas	Hartford	Milwaukee	Pittsburgh	San Francisco
Boston	Chicago	Denver	Indianapolis	Minneapolis	Portland	Seattle
Buffalo	Cincinnati		Kansas City		Rochester	Washington, D. C.

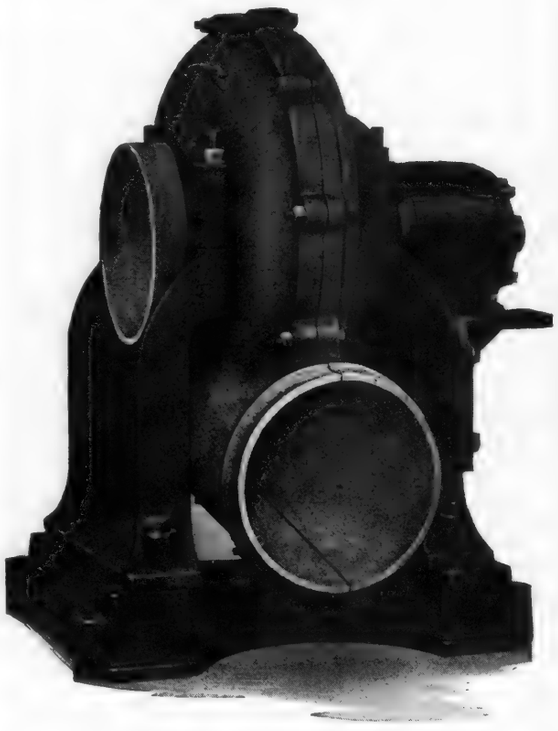
Canadian Offices at: Toronto, Montreal and Galt, Ont. Also Agents in Principal Foreign Countries.

Sturtevant REG. U.S. PAT. OFF. the Silent Unit Ventilator

ACID FUMES

drawn at high velocity through an exhauster accelerate the corrosive action. Protective coatings and linings cannot long withstand this severe condition. Duriron, being *solidly* resistant to acid fumes and the condensate formed, can —*and does.*

Duriron acid-proof exhaust fans will handle corrosive fumes permanently and with a minimum of attention.



Duriron exhaust fan No. 150-A. Maximum capacity 2200 cubic feet per minute. May be furnished for any type of rotation and either belt or direct motor drive. This fan may be hung from ceiling when so desired.

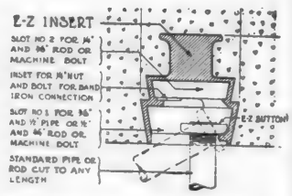
Duriron is produced only by

The DURIRON COMPANY DAYTON·OHIO

E Six in One Z

Concrete Inserts

One Size for All Pipe Hangers


E-Z INSERT
SLOT NO. 2 FOR ¾" AND ⅝" ROD OR MACHINE BOLT
INSET FOR ⅝" NUT AND BOLT FOR BAND IRON CONNECTION
SLOT NO. 1 FOR ⅝" AND ½" PIPE OR ½" AND ⅜" ROD OR MACHINE BOLT
STANDARD PIPE OR ROD CUT TO ANY LENGTH
E-Z BUTTON

ONLY one size needed for all pipe hangers. Ball and socket connection between insert and hanger. Fully adjustable — allows play to overcome expansion and inaccurate alignment of inserts. *E-Z Button turns in the insert—no couplings or turn-buckles needed.* Write for details and prices.

E-Z Radiator Hangers for All Tube Type Radiators

They enable use of *legless* radiators for easier floor cleaning, furnishing or carpeting. No radiator legs to interfere with mop or sweeper.

Write for Typical Specifications

HEALY-RUFF CO.

772 Hampden Ave. St. Paul, Minn.

For Heating and Ventilating Use

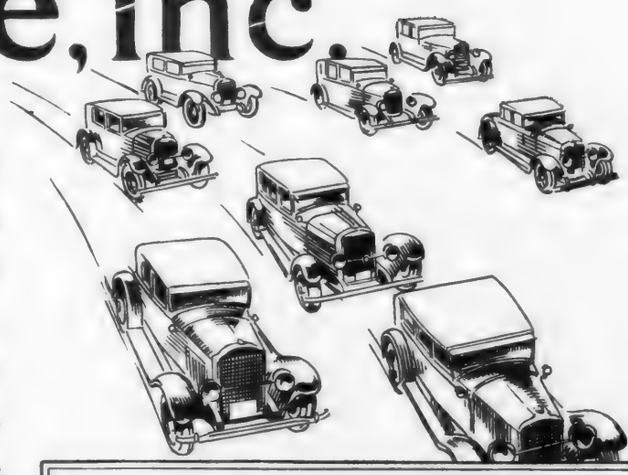
Waterproof Slot Insulation That *Withstands 8,000 Volts*

Here's unusual protection for motor and user against dangerous "grounds" —an insulation that withstands a minimum of 8,000 volts. Another reason for the dependability of Emerson Motors. A. C. and D. C. 1/30 to 2 hp.

THE EMERSON ELECTRIC MFG. CO.
2018 Washington Ave., St. Louis, Mo.
806 W. Washington Blvd., Chicago, Ill.
50 Church St., New York City.

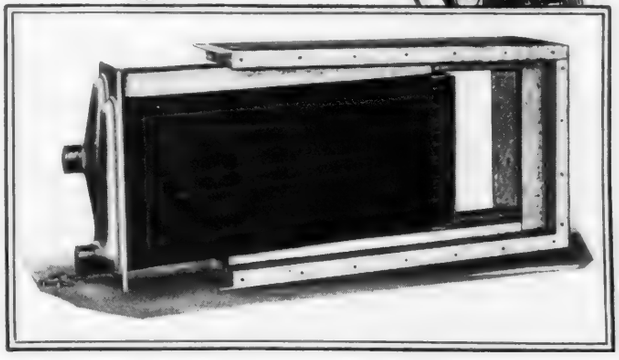
EMERSON MOTORS *and* **FANS**

BOOK Tower Garage, Inc.



An enormous 12-story building, advertised as the "Most Modern Garage Building in the Country," with accommodations for 1000 cars . . . entirely heated by 26 York Heat-Diffusing Units . . . every Unit utilizing York Super-Fin as the heating element . . . an appropriate answer to the question, "Where are they used?"

It is worth your while to be familiar with the following outstanding facts about Super-Fin, the newest scientific development of extended surface radiation: Tested to 1000 lbs. hydrostatic pressure; for high or low pressure; easily removed from casing; no joints to leak; supply and drip headers at same end; prices low; a York Engineering Product.



YORK SUPER-FIN

We will gladly furnish information either of a general nature or to meet special conditions. Write us today.

YORK SUPER-FIN RADIATION

YORK HEATING & VENTILATING CORPORATION

1539 SANSOM STREET, PHILADELPHIA

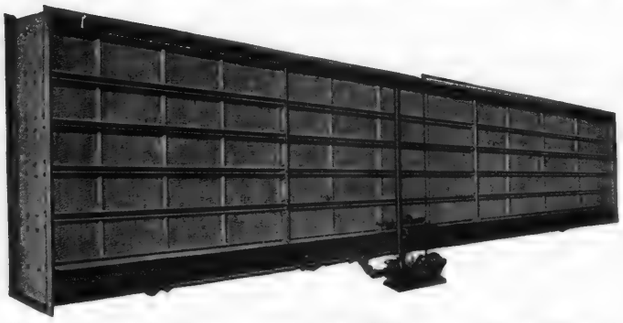
Engineered Products

Are You Posted on the Latest Developments in Air Cleaning Filters?

IN the press of your own business it is hard to find the time to keep abreast of developments in the various kinds of equipment.

It is worth while, however, to take a little time now and then and post yourself on improvements and advances that have been made.

In the case of Air Filters, for example,—do you know that there is a filter which actually **eliminates completely** the human element from filter operation?



The G. A. F. Automatic, Self-Cleaning Air Filter—Typical Large Unit, Normal Capacity 90,000 C.F.M.

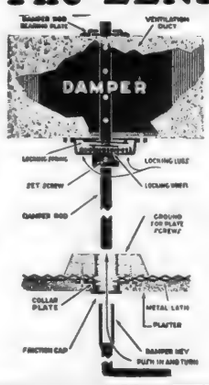
Its operation is fully automatic. It cleans the air, washes itself and ejects the accumulation of dirt with never a call for attention. There are no exceptions;—no strainers to clean, no bulky pans to empty, no tanks to clean out and no other more or less mean jobs.

And as to performance,—well pleased users all over the country will testify that in efficiency and reliability it is as far ahead as it is in automatic operation. The list of users is of a length and character that will satisfy anyone as to the standing of this filter.

A new 24-page catalog tells the story. It is well illustrated and written and printed for easy reading. **Write for a copy** and bring yourself up-to-date on air filters.

General Air Filters Corp.
Division The W. B. Connor Co. Inc.
369A Lexington Ave., New York
Manufacturers of Air Cleaning and Conditioning Equipment, Air Filters, Air Washers, Spray Nozzles

The ZENITH Self-locking DAMPER LOCK

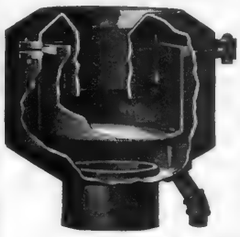


Positively and automatically locks volume and splitter dampers in concealed ventilation ducts, in any position. No wing nuts, screws or devices loosened by vibration.
Concealed—Only one-inch plate, flush with plaster, shows.
Tamper-proof — Operated only with special socket wrench.
Economical—Inexpensive, easily installed, quickly adjusted.
A trial will demonstrate its value.

WRITE FOR LITERATURE

NORTHERN WEATHERSTRIP COMPANY
367 South First Avenue East
Duluth Minnesota

DICKINSON ALL-CAST-IRON EXHAUST HEAD



Prevents oil and water content of the exhaust system from escaping and falling upon the roof, which otherwise would bring about a condition of decay and disintegration.

Dickinson Exhaust Heads will last as long as the average building.

Made of All-Cast-Iron

ÆOLUS DICKINSON
3336-44 So. Artesian Ave. CHICAGO
(Some territory open for agents)

KAUFFMAN

AIR DIFFUSERS

SINCE 1908

Kauffman Air Diffusers

HAVE BEEN IN USE IN

Some of America's Finest Theatres

Simple to Install—Low in Price
Graduated Air Control

AMERICAN METAL PRODUCTS CORP.
ST. LOUIS, U. S. A.

Specify Rome Helicalfin Tubes

for Air Heating and Cooling Equipment

Maximum Radiator Service
Lowest Air Friction Loss
Complete Line of Sizes

Flat continuous radiating fin—no corrugations.

Quantity production.

Small sizes for refrigeration condensers, oil coolers, etc.

Medium sizes for unit heaters and blast heating and ventilating systems.

Large sizes, ends threaded for bathroom heaters, direct factory heating and concealed direct radiation.

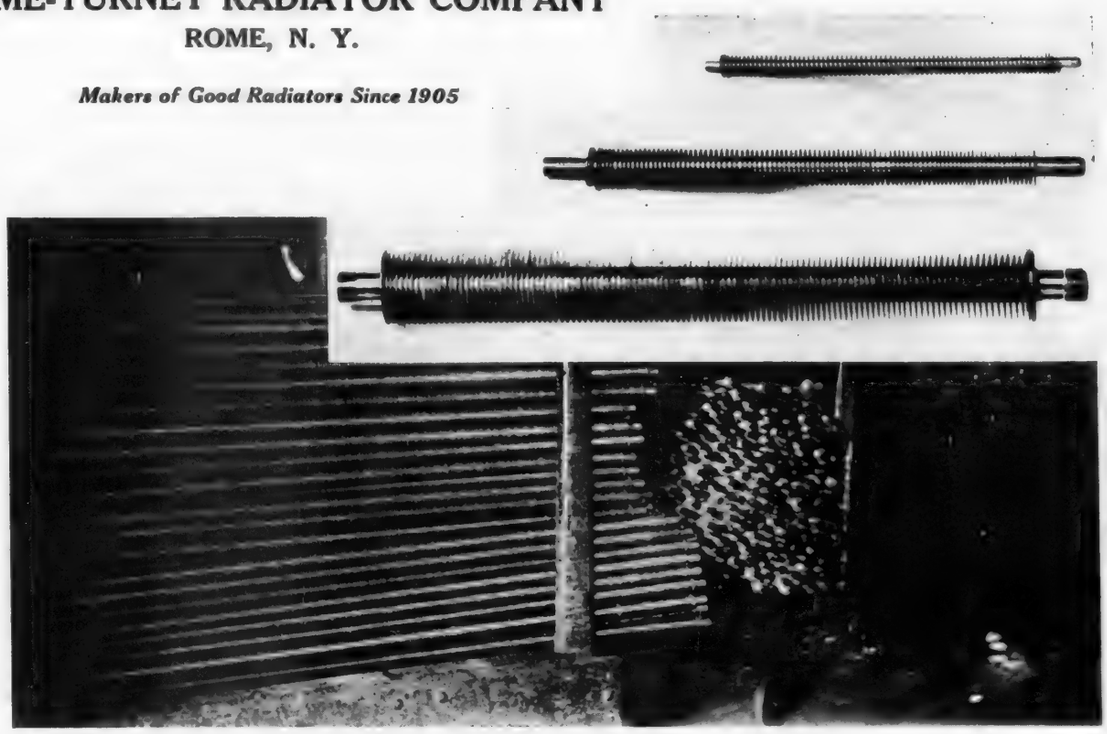
Furnished ready for installation, with guards if desired.

Seamless Copper Construction

Engineering data covering the performance of Rome HELICALFIN Heaters has been prepared by a nationally known test engineer and is available upon request.

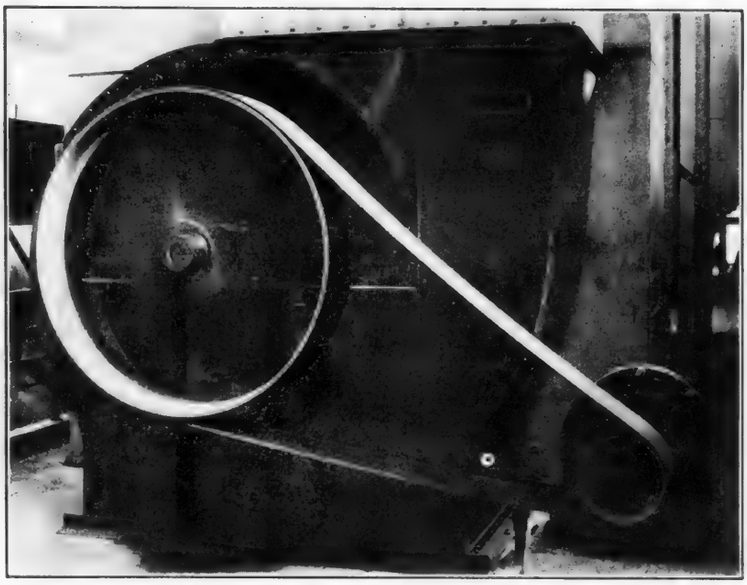
ROME-TURNEY RADIATOR COMPANY
ROME, N. Y.

Makers of Good Radiators Since 1905



"TENTACULAR"

For Higher Efficiency in Power Transmission



50 H. P. "Tentacular" Fan Drive
Note how simple this is:
Two ordinary Standard cast-iron pulleys slightly crowned
One "Tentacular" Belt. That's all.
No Slip—No Friction Resistance
Cool Bearings Perfect Drive

Engineers realizing what Efficiency in Power Transmission means specify "TENTACULAR"

A "Tentacular" drive is cheaper, simpler and much more practical than other systems of the same class

Recommended for Noiseless Operation

Write today for our Tentacular Bulletin

Alexander Brothers, Inc.
19 South Street Philadelphia
Sole Makers of Tentacular Patented Belt

TURTLEBACK
TRADE MARK

PRESTIGE

The rapidity with which Turtleback Air Diffusers have won the favor of many architects and engineers makes us feel that we are justly proud of our ability to produce an air diffuser that meets their exacting requirements. Turtlebacks could not have acquired nor could they continue to hold the confidence of these men if they were not just what they are—truly efficient air diffusers.

Turtlebacks are easy to install, simply adjusted and rigid when locked in place by the center set screw.

Write for illustrated catalog

VENTILATING PRODUCTS CO.
2800 Cottage Grove Ave., Chicago, Ill.

TYPHOON

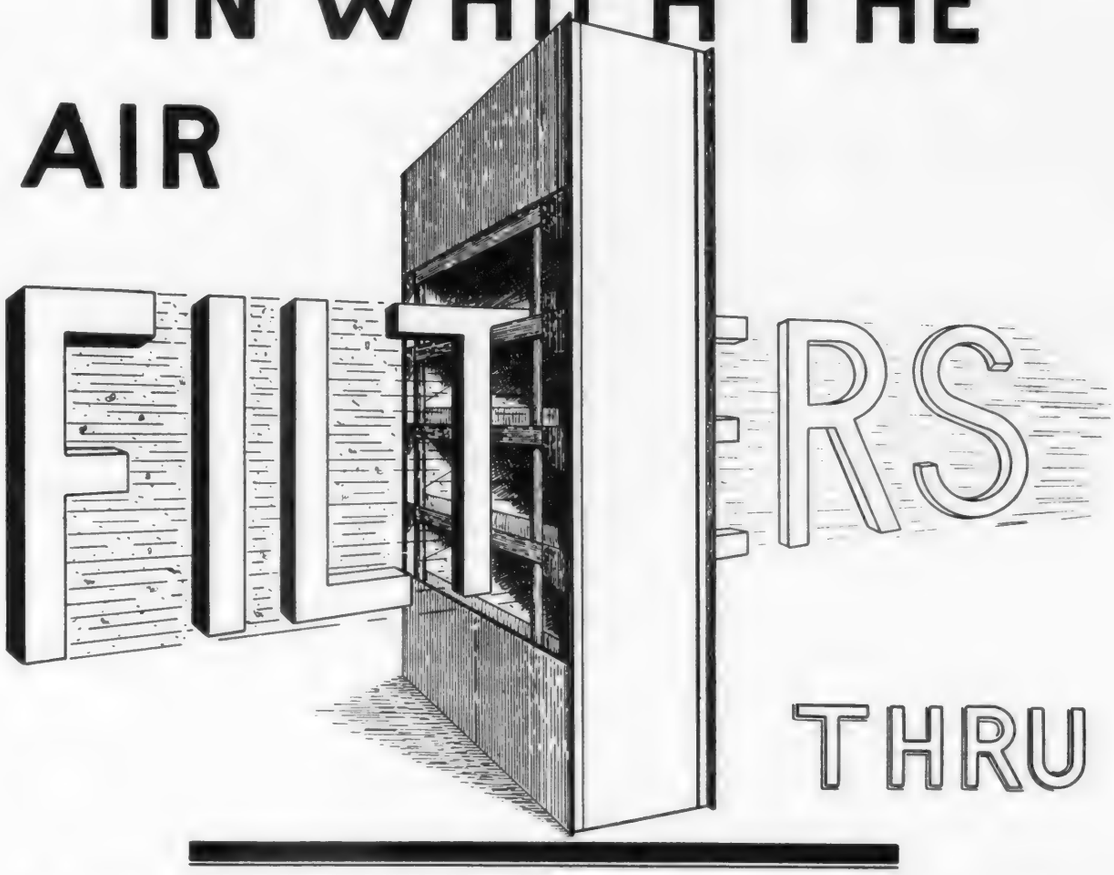
Multiblade Disc Blower

Disc Blowers
Centrifugal Blowers
Belt-driven Direct-connected
Unit Drive Fans
Unit Heaters
Ventilating Systems
Air Conditioning Systems

Typhoon Products and Typhoon Systems have been installed all over the country and all over the world. Typhoon is an international standard of efficiency for cooling, heating, and ventilating systems.

TYPHOON FAN COMPANY
345 West 39th Street
New York City
Dealers' and engineers' inquiries invited

AN AIR FILTER IN WHICH THE AIR FILTERS THRU



A Basic Principle of Efficient Filtration

The reason you get such high cleaning efficiency in the Midwest Horizontal Self-Cleaning Air Filter is because of the multiplicity of fine sub-currents into which air is broken up in passing through the cells.

Here is an air filter which *really filters the air!*—Filters it as you understand the word filter to mean: according to methods prescribed by experience in filtering both liquids and gases.

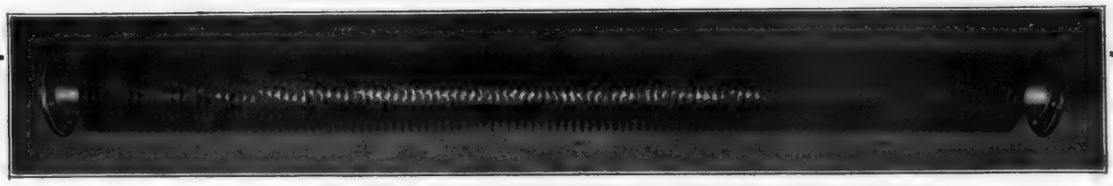
Examine the construction of a Midwest Cell; note the density of the medium; imagine the difficulty even small grains of dust would have in passing through.

Then turn on the air and read the gauges. In operation *this filter offers no more resistance than less efficient types;* therefore it utilizes less power and is more economical to operate.

MIDWEST AIR FILTERS

INCORPORATED

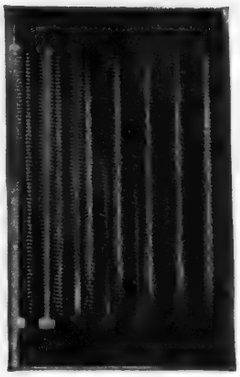
BRADFORD, PA. *OFFICES IN PRINCIPAL CITIES*



Specify RADIAFIN TUBES
for air-heating and air-cooling units

These tubes have 6 to 10 times as much surface as plain tubes of same size.

Units built with them have more surface and greater capacities with fewer tubes and fewer joints.



½" to 6".
Lengths up to 15 ft.
High or low pressure.
Plain or flanged ends.
With or without headers.
Quantity production.

Ask our Heat Transfer Dept. for additional details.

SCHUTTE & KŒRTING Co.
1153 Thompson Street PHILADELPHIA, PA.

The GORTON
Quarter Turn Packing Lock Radiator Supply Valve

is the only Radiator Valve where a quarter turn of the lever handle will fully open or close it.

The full size, unobstructed horizontal passage through the Gorton Valve is very important, particularly on single pipe work. The ordinary valve presents an obstruction to the flow of steam to the radiator and return of water of condensation.

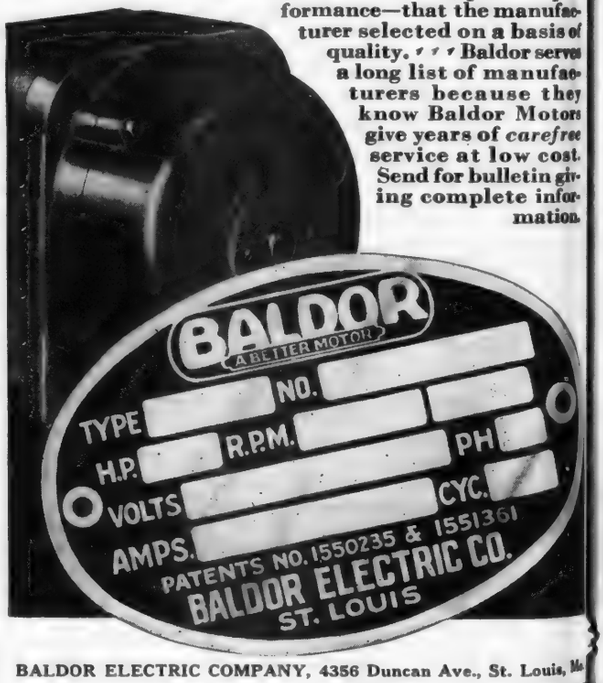
A Truly High Grade Valve

Specify it on your good work where a real good valve should be used.

GORTON HEATING CORPORATION
Formerly Gorton & Lidgerwood Co. (Established 1887)
96 Liberty Street, New York City

What this name plate means

When you find the name *Baldor* on the motor driving your equipment, you know that motor was selected because of its sure, positive performance—that the manufacturer selected on a basis of quality. ' ' ' Baldor serves a long list of manufacturers because they know Baldor Motors give years of *carefree* service at low cost. Send for bulletin giving complete information.



BALDOR ELECTRIC COMPANY, 4356 Duncan Ave., St. Louis, Mo.

A 300,000-C.F.M. *Streamline* Automatic Filter!

Reed Air

TRADE *filters* ALL METAL MARK

THIS 300,000-C.F.M. Reed Streamline Automatic Air Filter (25 No. 62 sections), photographed during our factory tests, is now cleaning the air for the finishing department of one of the country's leading automobile manufacturers. The Reed Automatic was selected by the purchaser's engineers only after thorough investigation into the exclusive streamline principle and the simplicity, efficiency and reliability of the filter itself.

Entirely automatic. No personal attention required. No mechanical movement. Nothing to wear out—nothing to get out of order. High cleaning efficiency—97% guaranteed. Constant, low air resistance—.25 of water. Easy and economical to install.

These are some of the reasons for the constantly-growing preference for the Reed Streamline —it will pay you to write for all the facts.

REED AIR FILTER CO., Incorporated
218 Central Avenue, LOUISVILLE, KY.
Representatives in Principal Cities

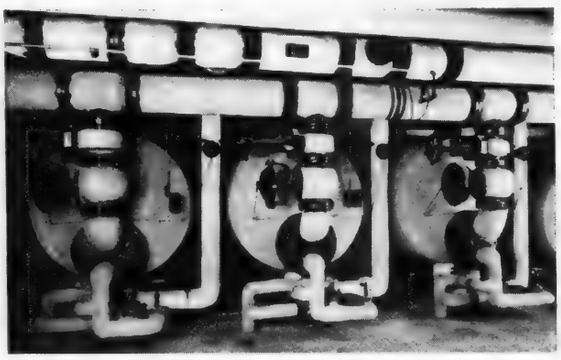
Lock the stable door before you lose another horse!

LAST year's fuel bills may tell the story of waste, but past experience is water gone over the dam. This year's bills are what your clients are interested in now. Heating engineers are insisting more and more upon instrument control on heating plants as the surest way to check waste and to increase efficiency.

There are many applications of Foxboro Instruments to heating problems. A well-placed Foxboro Instrument Board will give you the whole story of temperatures and pressures. Foxboro Recording Instruments make continuous written records of temperatures and pressures for present and future reference.

Foxboro Temperature Recorder-Controllers not only record results, they control them by air-actuated valves. Whether your heating plant is steam or hot water, vapor-vacuum or pressure, you must have accurate records to get the best results from the fuel you burn.

Our wide experience in the application of Foxboro Instruments to modern heating and ventilating plants is at your disposal, without obligation. Just write our nearest branch office.



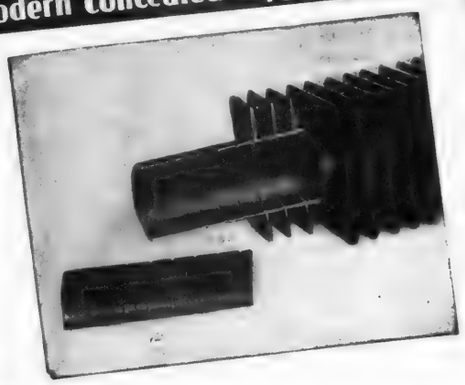
Foxboro Thermometers on Whitlock Coil Heaters at the Pennsylvania Athletic Club, Philadelphia.

THE FOXBORO COMPANY
Neponset Avenue, Foxboro, Mass., U.S.A.

New York Chicago Philadelphia Boston Pittsburgh
Detroit Cleveland Tulsa Rochester Atlanta
San Francisco Dallas Los Angeles Portland, Ore.

FOXBORO
REG. U. S. PAT. OFF.
THE COMPASS OF INDUSTRY

Convecto
the modern concealed copper Radiation



-by actual test delivers more than one square foot of cast iron radiation per inch of length over fin. Costs very little more than cast iron.

Conceal within wall or in artistic cabinet. ***Invisible, Indestructible, Efficient.***

PIN TO LETTERHEAD

METAL STAMPING CO.
LONG ISLAND CITY, N.Y.

METAL STAMPING CO.
ESTABLISHED 1872
LONG ISLAND CITY N.Y.

Send me full details on Convecto Copper Radiation.

Name.

Send coupon for facts about the latest thing in heating

THE No. 3 THERMOFLEX-HYDRON ANGLE RADIATOR TRAP

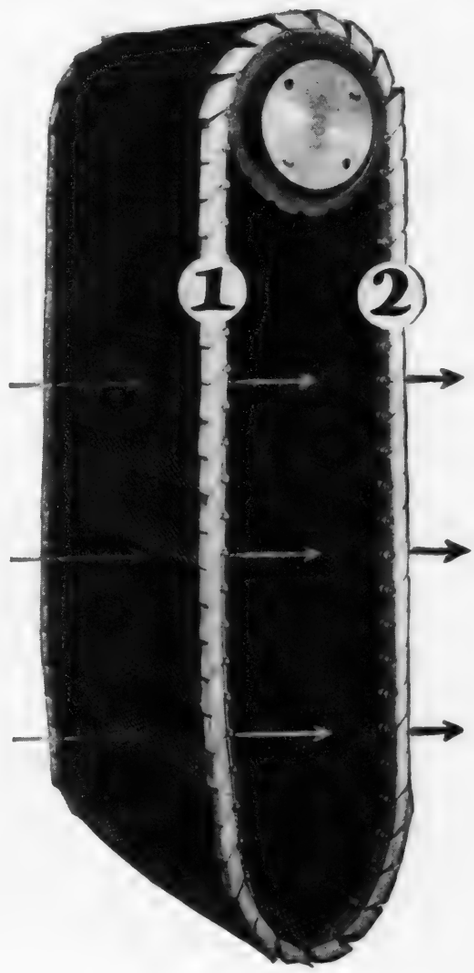
The Hydron Bellows is the only **hydraulically formed proof-tested** bellows used in thermostatic radiator traps today. Each and every bellows is subjected to several hundred pounds, internal hydraulic pressure in the making. Weak, uneven, or defective metal **will not** make a Thermoflex-Hydron Bellows.

Our new complete catalog No. 52 is now ready for delivery. Gladly mailed upon request.

W. D. CASHIN COMPANY
35 Hartford Street **Boston, Mass.**

The TooPas Air Filter

A design patterned after the time-tested Phoenix



Embodying the double pass principle of air filtration for the first time in readily adaptable form.

Oil entrainment positively eliminated.

Filtering medium cleaned by immersion principle.

Sectional construction fits any wall opening.

Motor drive can be eliminated without sacrificing ease of servicing.

Adaptable to volume manufacture, ease of shipping and erecting.

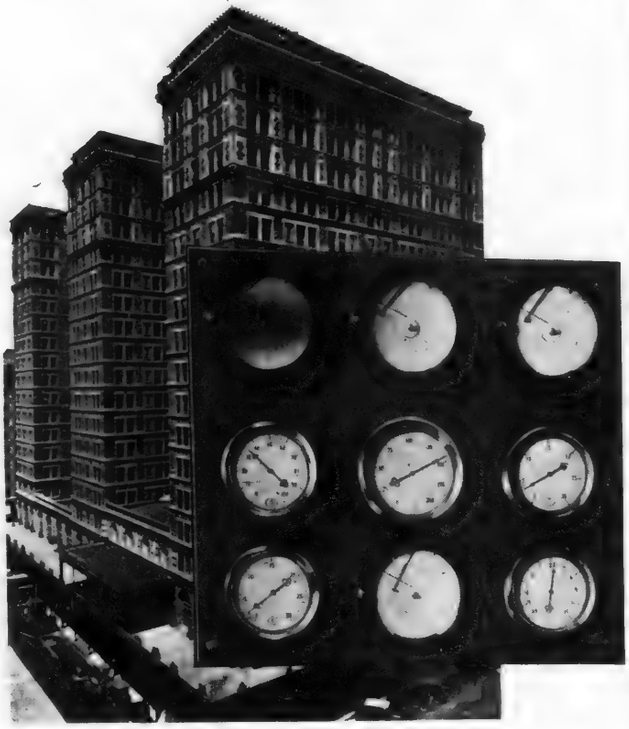
Send for Bulletin!

NATIONAL AIR FILTER COMPANY

5130 Ravenswood Avenue, Chicago, Illinois

H & V9-Gray

GAUGE BOARDS



American Gauge Board in Rice Hotel, Houston, Texas.

American Gauges, Recording Gauges, Dial Thermometers, Recording Thermometers and Clocks are furnished in the same case for uniformity of appearance, either for wall or flush mounting. They make ideal gauge board installations.

Write for the following Catalogs:

Gauge Catalog A-14,
Recording Gauge Catalog E-14,
Gauge Tester Catalog D-14,
Relief and Pop Valve Catalog V-14,
Thermometer Catalog F-14,
Dial Thermometer Catalog G-14,
Recording Thermometer Catalog H-14,
Temperature Controller Catalog R-14.

AMERICAN INSTRUMENTS

Makers of American Industrial Instruments since 1851.

CONSOLIDATED ASHCROFT HANCOCK CO. INC.
AMERICAN SCHAEFFER & BUDENBERG DIVISION
338 Berry Street Brooklyn, N.Y.

Hot Water--

for large building or small, there is the right type of Paracoil Water Heater for your needs. Fully guaranteed both as to construction and performance.

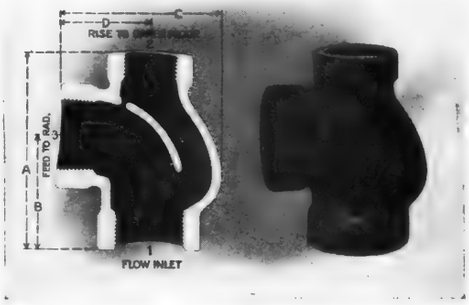
Send for catalog.

DAVIS ENGINEERING CORP.
90 West St., New York City

Paracoil
WATER HEATERS

Blake Testite O. S. Distributor Fittings

SAVE FITTINGS, LABOR, FUEL—
INCREASE CIRCULATION

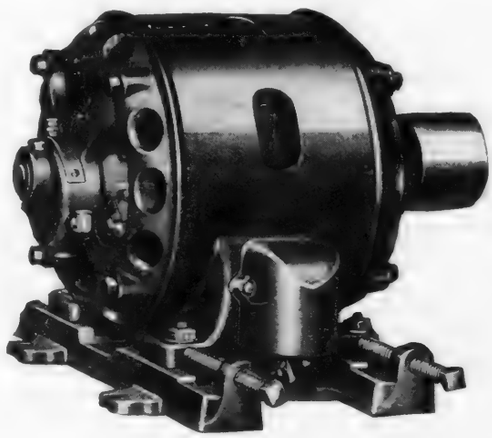


For Hot Water Heating Systems and Domestic Hot Water Supply

Perfect Control of the Circulation. No Short Circuiting. The Lip Distributes the Water Evenly

Made in 39 Sizes
Your Jobber Will Furnish Them

BLAKE SPECIALTY COMPANY
ROCK ISLAND, ILLINOIS



¾ Horse Power Century Type RS
Repulsion Start Induction Single Phase Motor

Dampness Does Not Affect Them

Many hundred thousand Century Type RS ¼ Horse Power Repulsion Start Induction Single Phase Motors have been operating satisfactorily over long periods of time . . . many for more than 14 years. Even in moist surroundings and humid, tropical climates their continuity of service has been proven in such exacting installations as electrical refrigerators, oil burners, and similar apparatus.

The windings are thoroughly insulated and are then saturated with insulating varnish. This preserves the insulation and protects the windings . . . dampness does not affect them.

In such installations as pumps, dishwashers, laundry machinery, bottlewashers and creamery equipment, Century Type RS Repulsion Start Induction Single Phase Motors can be depended on for long, continuous service.

Century Type RS Repulsion Start Induction Single Phase Motors are built in standard sizes from 1/8 to 40 horse power.

CENTURY ELECTRIC COMPANY
1806 Pine St. St. Louis, Mo.

35 Stock Points in the United States and more than 50 outside thereof

Century MOTORS

"THEY KEEP A-RUNNING"

ROYAL HAWAIIAN HOTEL
Honolulu, T. H.

WARREN & WETMORE
Architects, New York

RALPH E. WOOLEY
Structural Engineer, Honolulu

WHITLOCK HEAT TRANSFER PRODUCTS

Consult your local telephone directory

New York Boston • Philadelphia
Chicago Baltimore Detroit
Los Angeles San Francisco
And Other Principal Cities

. . . and in the South Seas too!

Recognition of the popularity of Whitlock Heating Equipment is not confined to the Continental United States. Successful and satisfactory installations have been made in many foreign countries. Four Whitlock Type R Heaters furnish an ample supply of hot water in the new Royal Hawaiian Hotel at Waikiki Beach, Honolulu. Regardless of where the building you may be planning is to be located, you'll find it worth while to let one of our Hot Water Engineers figure with you on the hot water requirements.

THE WHITLOCK COIL PIPE COMPANY
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Are You Satisfied with the controls you are recommending?

HOT WATER REGULATOR

PRESSURE REGULATOR

TEEPLE Temperature Controls combine the most advanced design with skilled workmanship. They meet every problem of heat control for gas furnaces and boilers; unit heaters; refrigerating plants; ovens; furnaces; and automatic coal and oil burners. You can recommend them wholeheartedly.

You'll want this new Catalog . . .
Our latest Catalog fully illustrates and describes the full line of Teeple Controls. Write for it.

L. R. TEEPLE CO., Portland, Oregon

TEEPLE
TEMPERATURE
TEEPLE *Controls*
for GAS — STEAM — WATER — AIR

THERMOSTATIC METAL

The most accurate, constant and durable of expansion units

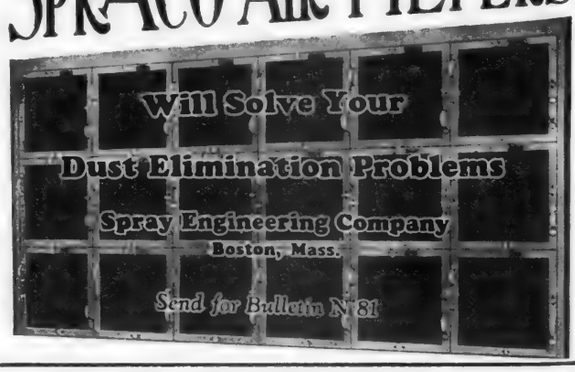
FOR LOW AND HIGH TEMPERATURES

Our No. 1800 metal for temperatures up to 450° F.
Our No. 2800 metal for temperatures up to 1500° F.

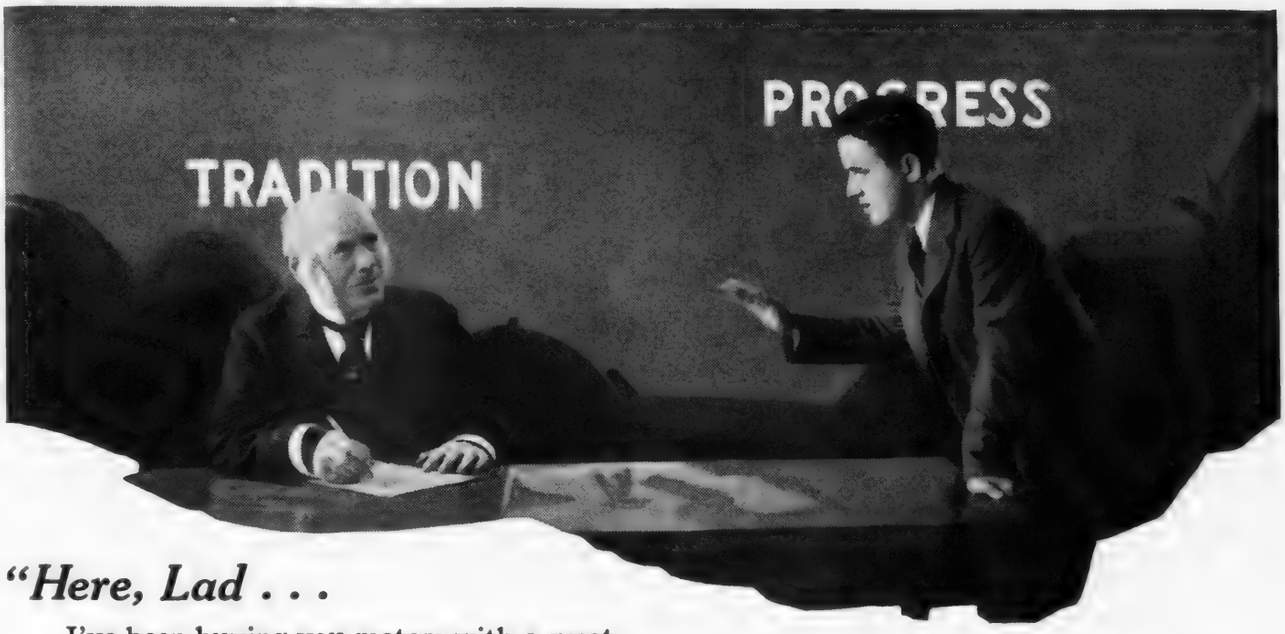
Positive and Dependable Thermostatic Metals

W. M. CHACE VALVE COMPANY
1600 Beard Avenue
Detroit, Michigan

SPRACO AIR FILTERS



Pop learns how to judge motors.



"Here, Lad . . .

I've been buying you motors with a great reputation and yet you are always crying that we're on the wrong track.

I think I'll write to all the motor manufacturers to come and see us. In that way we'll get all their views on how their particular motors meet our qualifications."

"Yes, Pop . . .

and that's all you *will* get.

You're an old enough employer to know what happens when you put an ad in the paper for an employee to meet certain qualifications.

Rafts of them meet them on interview.

About one in ten actually comes through with flying colors when put to work.

A better way is to put on your galoshes and snoop around in plants similar to ours where motors are put to a hard test on machines.

Ask each superintendent, not for good points, but for troubles they've had with their motors.

You'll find that most of them will say that bearing troubles cause most of the failures.

Then look for the motor with the biggest bearings and shafts and you'll find the way out of that cost.

I'll tell you now that the 'Linc-Weld' is that motor.

You'll find that to be a much better plan than buying simply reputation because

— many a man's reputation is based largely upon what isn't found out."

"Linc-Weld" Superiority is due to:

1. **Larger Shafts**
2. **Larger Bearings**
3. **Better Insulation**
4. **Stronger Frame (Steel)**
5. **Greater Overload Capacity**

The Lincoln Electric Co., Dept. No. 16-9, Cleveland, Ohio

M-24

"Linc-Weld"

LINCOLN MOTOR

At this New High School

the hot water problem is settled for all time

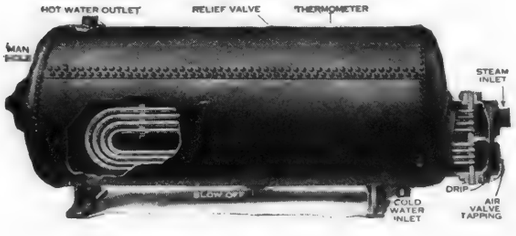
The residents of Addison, N. Y., are justly proud of their new high school illustrated above. For not only is it a handsome structure, but nothing is wanting in providing every comfort for the students.

In selecting hot water heaters on which they could rely to give the utmost efficiency and durability, the "Patterson" was chosen by Palmer Rogers, Architect, Ben H. Krey, Engineer, and Frank T. Lawrence, Inc., Heating Contractors.

All element of risk is eliminated when you install Patterson Hot Water Heaters. They are guaranteed to deliver all the hot water required, as hot as required and as quickly as required.

Let us send you a copy of our catalog and list of prominent installations.

The Patterson-Kelley Co.
107 East 40th St., New York, N. Y.



Patterson
Hot Water Heaters

A running story of heating system efficiency — *told by* BRISTOL'S *RECORDING THERMOMETERS*

Bristol's Original Form Recording Thermometer. Uses 8-inch and 12-inch Charts.

Placed at strategic points about your buildings they provide permanent chart records of temperatures maintained—a graphic story of conditions prevailing during every moment of the day and night. Thus should any question arise concerning what temperatures were held at such and such a time it is a very simple matter to refer to the Thermometer chart.

Such records also render a valuable service by pointing out where existing conditions can be improved.

Bristol's Thermometers can be furnished in desired ranges, from — 60° to + 1000° F., and in models to suit requirements. They are rugged, and require very little care.

Write for Complete Information

The Bristol Company

Waterbury, Connecticut

For your files

Every Heating and Ventilating Engineer is entitled to a copy of this Junior Catalog No. 21. Check off those items below in which you are interested, mail to us, and you will receive this catalog, prices, and whatever you may need in the way of information on any Atlas product.

☐ Reducing Valves ☐ Float Valves
☐ Temperature Regulators ☐ Swing Joint Fittings
☐ Bronze Unions
☐ Damper Regulators ☐ Thermostats
☐ Pump Governors ☐ Balanced Valves

ATLAS VALVE COMPANY
REGULATING VALVES FOR EVERY SERVICE
281 South Street, Newark, N. J.

P-H-I-L-L-I-P-S

Self-Drilling Expansion Shells

Every shell makes its own hole. Used in ceilings, walls, floors and beams for fastening pipe hangers, etc., and for bolting timber and other equipment to concrete and stone. Internal U. S. Standard Threads for rods, bolts and screws.

Quickly installed by hand or with PHILLIPS SPRING HAMMER. No DRILLS required.

Write for full details

Phillips Drill Company
1537 Cortlandt St., Chicago

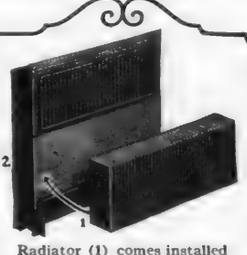
Office of Hon. Parker Corning, President of Albany Felt Company, Albany, New York. Equipped with Herman Nelson Invisible Radiators—and Univent Ventilation

RADIATORS . . . Really *Invisible* out of mind, out of the way

FOREVER out of sight and out of the way, the Herman Nelson Invisible Radiator has brought the answer to Heating and Ventilating Engineers asking for radiator heat advantages, with no radiator in the room.

Installed in any standard wall or partition, it leaves every inch of wall and floor space free for attractive interior effects and furniture arrangement.

And once installed, never again does the Herman Nelson Invisible Radiator need attention. It is small . . . light . . . compact. It is built of materials that insure leak-proof, rust-proof, indestructible service. Even freezing cannot harm it.



Radiator (1) comes installed in a steel case (2) more substantial than the wall itself. The complete unit is ready to install in any standard wall or partition.

HERMAN NELSON
Invisible
RADIATOR
For Steam, Hot Water, Vapor or Vacuum Heating

Successful installations everywhere have won for it universal endorsement by architect, engineer, contractor and business executive.

To learn how the Herman Nelson Invisible Radiator sets new standards in heating service, in appearance and sanitation, and how we can help you sell this advanced heating unit—send the coupon for the Invisible Radiator Catalogue.

THE HERMAN NELSON CORPORATION
Moline, Illinois
Please send me the illustrated book Number 33.

Name .....
Address .....
City ..... *State* .....

THE HERMAN NELSON CORPORATION
Moline, Illinois

The Unit Core RADIATOR INDESTRUCTIBLE TRADE MARK

Builders of Successful Heating and Ventilating Equipment for Over 20 Years

Sales and Service

BELFAST, ME.	BUFFALO	CHARLOTTE, N. C.	CLEVELAND	INDIANAPOLIS	GREEN BAY	ATLANTA	KANSAS CITY	SPOKANE	VANCOUVER
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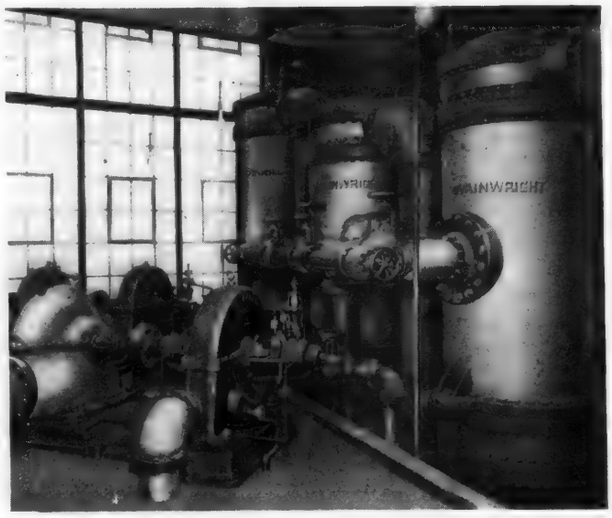
NEW YORK CITY	SCRANTON	SAGINAW	CINCINNATI	DES MOINES	ST. LOUIS	DALLAS	DENVER	SEATTLE	WINNIPEG, MAN.
UTICA	PITTSBURGH	DETROIT	TOLEDO	MILWAUKEE	BIRMINGHAM	EMPORIA	SALT LAKE CITY	SAN FRANCISCO	CALGARY, ALTA.

Comfortable Heating from Exhaust Steam



Wainwright hot water heaters supplying heat to college buildings. Wainwright heaters are built in both vertical and horizontal types to meet space requirements.

Wainwright heaters are built for any size project, hotels, apartments and hospitals.

A group of college buildings in Philadelphia is heated by the three Wainwright heaters shown in the accompanying photograph. Each heater will raise the temperature of 1600 gals. of water per minute from 170 to 205 deg. F. when supplied with steam at 1 lb. gage.

Temperature of the entire system is controlled from the central power plant and varied according to the weather to provide comfortable room temperature. Either exhaust or live steam may be supplied to the heaters.

FOSTER WHEELER CORPORATION
165 Broadway, New York, N. Y.
Branches in Principal Cities

Foreign Associates:—
Foster Wheeler Limited; London, England.
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AERO UNIT COAL PULVERIZERS
AIR HEATERS CENTRIFUGAL PUMPS
CONDENSERS COOLING TOWERS
ECONOMIZERS EVAPORATORS
EXPANSION JOINTS FEED WATER HEATERS

FOSTER WHEELER

FRACTIONATING TOWERS HEAT EXCHANGERS
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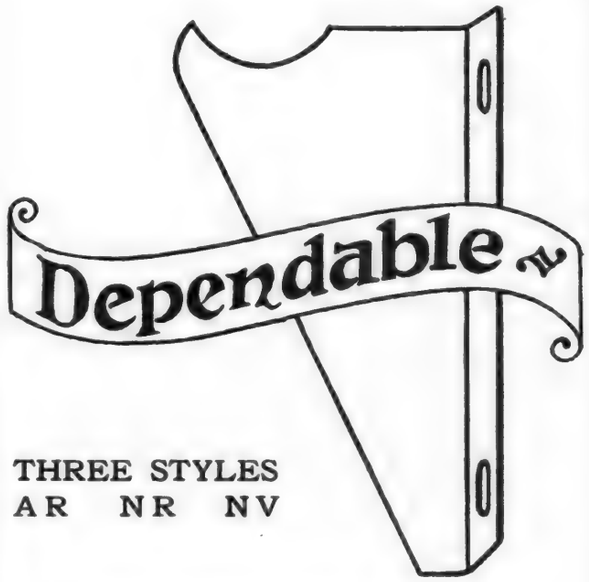
BRASS AND COPPER TUBING AND PIPE

HARTMANN
RADIATOR BRACKETS



THREE STYLES
AR NR NV

Write for Descriptive Circular and Price List
CHARLES HARTMANN CO.
975-993 Dean Street BROOKLYN, N. Y.

CENTRAL STATION STEAM CO.
2912 East Woodbridge St.
DETROIT, MICHIGAN

MANUFACTURERS OF

Cadillac Condensation Meters
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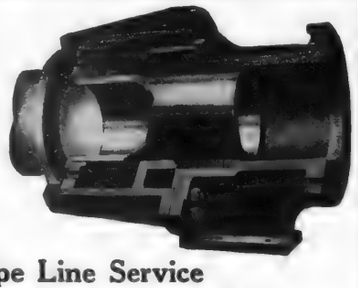
Packingless Expansion Joints and other special fittings for underground steam distribution mains.

HOWARD
Guided Expansion Joint



For Pipe Line Service

Eliminates trouble from Expansion and Contraction, saves space, labor and repair bills; the construction is mechanically correct.

ALBERGER HEATER CO. 285 Chicago St.
HOWARD IRON WORKS Buffalo, N. Y.

ROBRAS 20-20

How Do YOU Participate In This $500,000,000 *REMODELING MARKET?*

EACH year over two hundred thousand old houses are remodeled at a cost of over five hundred million dollars. Installing new or additional heating and plumbing equipment is one of the most important items.

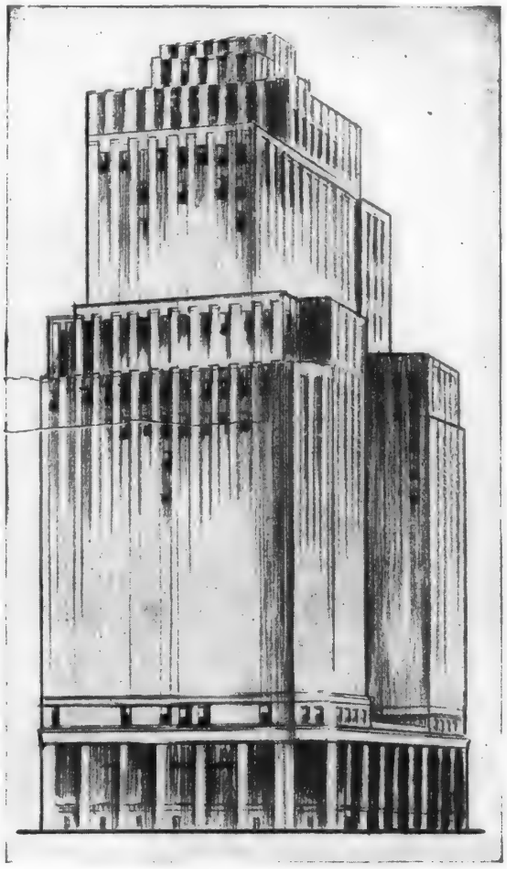
These Robras 20-20 Radiators are supremely important to the owner who is anxious to bring his house up to date. With them he will no longer have the "ugly radiator problem." The radiators are designed to go in the natural recess in the studding. They are usually set up in the wall, under the window, out of sight and out of the way.

Suggest to owners that they use Robras 20-20 Radiators to eliminate radiators from sight in all rooms. Owners will realize that you are in a position to help them.

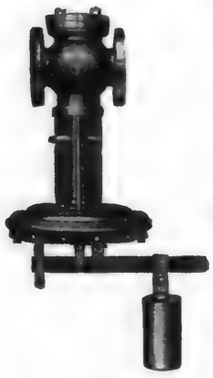
If you don't know as much as you wish about these Robras 20-20 Radiators, send us your name and we will send you data sheets and full information. This is important because we are constantly referring many owners to you.

ROME BRASS RADIATOR
CORPORATION

ONE EAST FORTY-SECOND STREET :-: :-: NEW YORK CITY



General Motors Building New York, equipped with Mason Regulators



Mason Lever Style Reducing Valve designed for heating systems requiring accurate regulation of steam at low pressures.

The choice of Mason Regulators for use in the heating systems of this country's finest buildings is convincing proof of their dependable, trouble-free operation in service.

Easy to install, moderate in price, require no servicing afterwards . . . experienced contractors know it is to their advantage and profit to include them in the contracts they handle.

Write for a copy of newly revised Catalog No. 62.

Mason Regulators

MASON REGULATOR CO.
BOSTON, MASS. 2146

A New Unit Heater Trap

"has all the desirable features"

No. 73 Sterlco Unit Heater Trap
(Combination float and thermostatic)

Non Air Binding
No Cooling Leg Required
Cannot Freeze
Drains Completely when Cold
Weighs only 10½ lbs.
No Supports Required
Only One Moving Part
Nothing to Wear or Get out of Order.

STERLING ENGINEERING CO.
1640 Holton Street
Milwaukee, Wis.

Representatives in all the principal cities

NOT a Cover—but a Complete Radiator

Truly Attractive More Efficient

Attractive because the beautiful cabinet of heavy furniture steel can be painted any color desired to harmonize with the decorative treatment.

More efficient because, instead of sending heat up against walls and draperies to soil them, it directs a flow of warm, humidified air into the room with **sufficient initial velocity to create complete circulation**—warming rooms quicker, and evenly throughout.

Corner of a room in Guyon's Hotel, Chicago, heated throughout with McQuay Cabinet Radiators

Concealed Radiators **McQUAY Cabinet RADIATOR** ***Unit Heaters***

With the McQuay Concealed radiator, only an attractive grille and an inconspicuous opening near the floor are visible

The indestructible copper heating unit (a distinctive McQuay achievement) has been proved by every possible test to be the most efficient known.

Installations in countless of the finest buildings prove they fill every heating need. Their unobtrusive beauty immediately wins the approval of tenants. **Owners like them because they are more efficient and also help rent buildings**—a fact which is being proved every day. Ask any owner who has installed McQuay—we'll gladly give you the list.

Get prices before deciding. Actually the total cost (installed) is very little more than for old-style radiators.

In looking for an apartment or home this fall—select one McQuay Heated. You'll notice a big difference.

McQUAY RADIATOR CORPORATION

General Sales Office: Pure Oil Building, Chicago
Eastern Branch: 2148 Graybar Bldg., New York City

Title Insurance Building, Los Angeles—Architects, John Parkinson & Donald B. Parkinson—Consulting Engineer, Elliott Lee Ellingwood—Heating Contractor, Pacific Pipe and Supply Company.

Jenkins on the radiators

— and elsewhere, too, in this new Los Angeles Building

Jenkins Low Bonnet Radiator Valves serve the new Title Insurance Building at Los Angeles, California. These valves are furnished in the handsome chromium finish.

All valves on the steam and hot water lines, too, are Jenkins. In this service medium pressure bronze and iron body gate valves are used.

Heating contractors give their clients assurance of trustworthy valve performance when they make certain that Jenkins Valves are installed.

JENKINS BROS.
80 White Street, New York, N. Y.
133 North Seventh Street, Philadelphia, Pa.
524 Atlantic Avenue, Boston, Mass.
646 Washington Boulevard, Chicago, Ill.
JENKINS BROS., Limited, Montreal, Canada; London, England

Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

Unit Heating for Greenhouses

WHERE individual Heaters are desired for greenhouses to effect a lower operating cost than is possible with a central heating plant, the large sized National Multi-Flow heater fills the need perfectly. Substantial saving in fuel bills, the scant attention necessary, and the steady uninterrupted service of many years strongly appeal to owners.

500 sq. ft. radiation, normal rating. Temperature rise 20° per hr. Large, double wound copper coil provides rapid circulation.

For apartment houses, clubs, small laundries, etc., an efficient heating unit. It will furnish an abundance of hot water 24 hrs. a day. 600 gal. storage tank.

The No. 20 Multi-Flow Heater furnished in gray japan jacket and black japan base.

NATIONAL

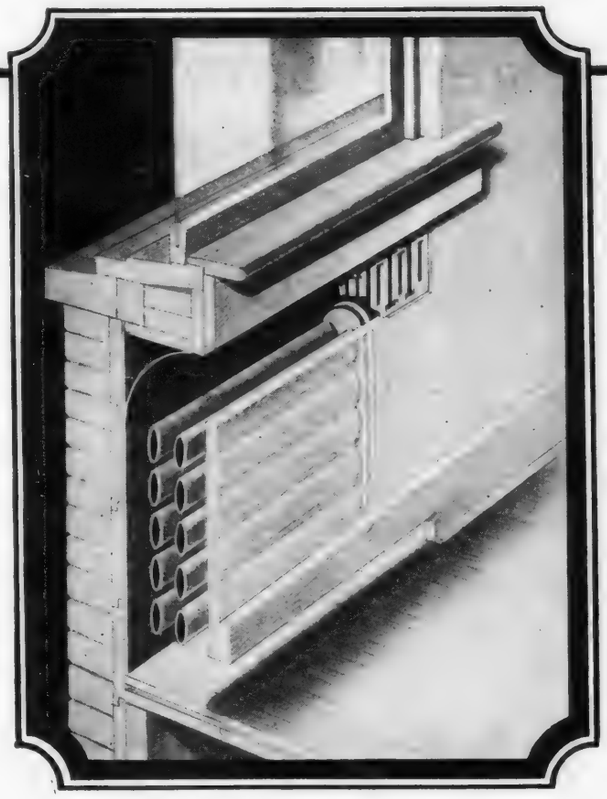
The National Pipe Bending Co.

Established 1883 120 River Street
New Haven, Conn.

BOSTON NEW YORK PHILADELPHIA

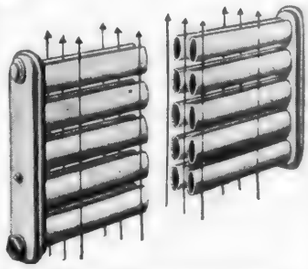
The Logical Radiator for Recessed Installation

Shaw-Perkins HIGH CONVECTION Radiators



Above cut shows the perfect adaptability of radiator to concealed recessed installation. The easy freedom with which the air can circulate and the radiator's sanitary design are strikingly apparent

Compact Sanitary Circulate More Air



"High Convection"

The Shaw-Perkins High Convection Radiator is all prime heating surface. The ingenious arrangement of the oval tubes allows the air to pass freely over the tubes, unimpeded by fins, plates, or top and bottom hub connections, consequently the radiator has a high heat emission by convection.

View above illustrates the high convection feature. Arrows indicate air travel. Note the absence of any impediments to free air circulation.

FOR concealed installation in wall recesses the Shaw-Perkins High Convection Radiator is unexcelled. Any radiator so installed as a semi-indirect radiator, depends entirely upon convection heat for its performance. It is hard to conceive of a radiator that could be more perfectly suited to this manner of installation than the Shaw-Perkins High Convection Radiator, with its high heat emission by convection.

Furthermore the sanitary design of the radiator is of utmost desirability in recessed installation, in comparison with radiators which contain fins, strips, plates, etc., to act as effectual dust accumulators and which are difficult to clean.

Shaw-Perkins High Convection Radiators are made of heavy gauge Armco ingot iron, all welded construction throughout. Manufactured in one piece jointless units, in several models and many sizes up to 14 feet in length and furnished with either legs or brackets. Unusually adaptable to many purposes.

Get the Full Story of this Modern Radiator

Send for Catalog H

Shaw-Perkins Manufacturing Company

Pittsburgh, Pa.

Nugent Crank Case Fuel Oil Filter

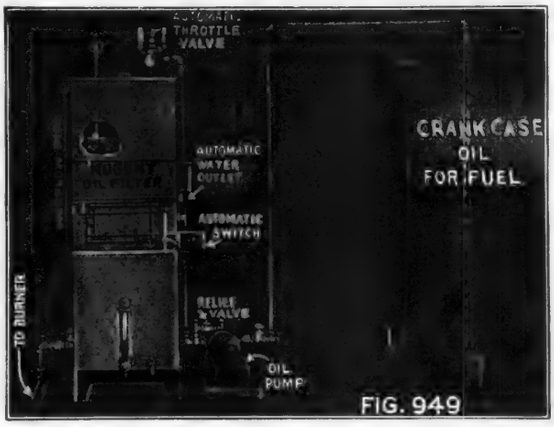


FIG. 949

HEAT YOUR BUILDING WITHOUT COST

BY BURNING DISCARDED CRANK CASE OIL

NO MORE BURNER TROUBLE

Write for catalog

WM. W. NUGENT & COMPANY

409 N. Hermitage Ave., Chicago, U. S. A.

Builders since 1897 of

Oiling Systems — Oiling Devices
Oil Filters — Oil Pumps

NUGENT TRADE MARK

Full Automatic

Any Capacity

Read this Letter

MONARCH GARAGE

1122-1130 HOLLYWOOD AVENUE AT THE L

CHICAGO, ILL.

Wm. W. Nugent & Co. December 19,1927.
Chicago,Ill.

Gentlemen:-

About a year and a half ago we purchased from you a Nugent Oil Filter and motor driven oil pump to filter automobile crank case oil for our oil burner.

This purchase has been one of the best investments we ever made, because the apparatus paid for itself in less than three months. We operate our burner on the filtered crank case oil entirely, consequently we have no fuel bills.

The filter removes the water, dirt, grit, and carbon from the oil so efficiently that the fine mesh strainer at the burner never has to be cleaned, and the burner operates perfectly.

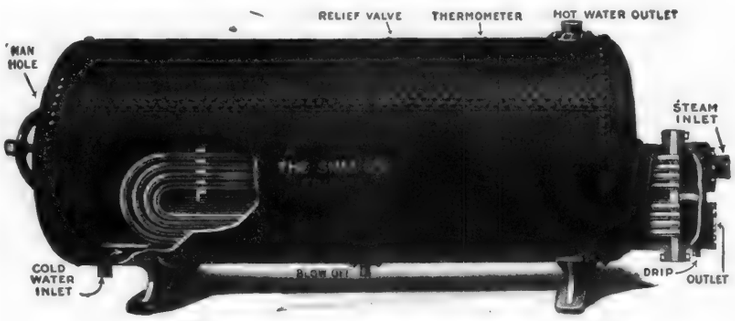
Cleaning the filter requires only ten minutes twice a week and there is no other upkeep to the filter, as the filtering elements will last for years without renewing.

We are very pleased with the filter and pump as well as the service you have given us. We highly recommend your apparatus to anyone.

Very truly yours,

MONARCH GARAGE

By E. Eckfeldt



"We keep others in Hot Water"

SIMS

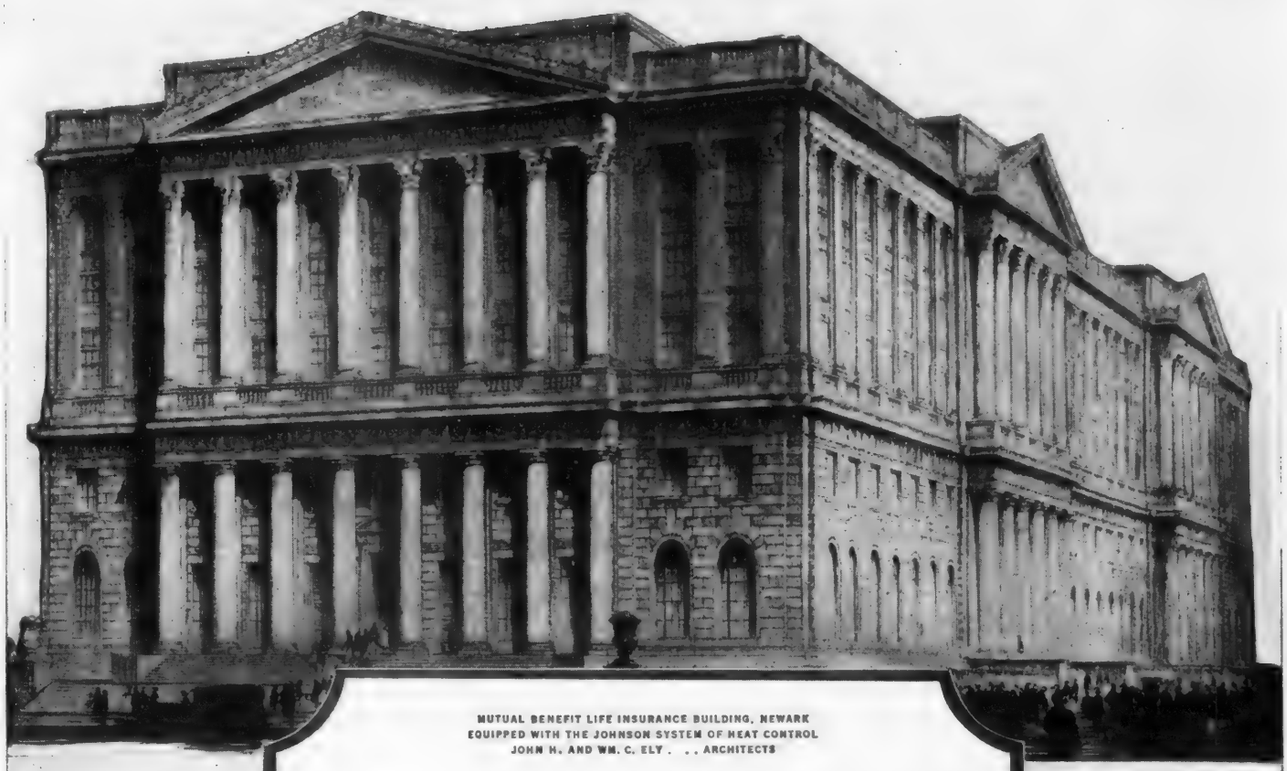
Storage type water heaters are furnished with "U" tubes as illustrated, or with straight tubes and floating head, as may be desired or specified.

SIMS

Water tube heaters and Converters are also constructed with either straight or "U" tubes.

All heaters are produced complete in our plant. They are not an assembly of parts built by others.

THE SIMS COMPANY, P. O. Box 700 Erie, Penna.



MUTUAL BENEFIT LIFE INSURANCE BUILDING, NEWARK
EQUIPPED WITH THE JOHNSON SYSTEM OF HEAT CONTROL
JOHN H. AND WM. C. ELY . . . ARCHITECTS

THE strong endorsement of Johnson Heat Control is the constantly growing vast number and variety of Johnson System installations — at the suggestion of the architect. The profession may assume a skeptical attitude toward automatic heat control: however, the contrary obtains after the architect's first Johnson System installation. Johnson Heat Control enjoys significant recognition and prestige as a result of forty-three years of unwavering service and architects' repeated experience with its efficiency.

The Johnson System Is Of Permanent, All-Metal Construction: And Is The All Perfect Graduated Intermediate System of Regulation

JOHNSON SERVICE COMPANY
MILWAUKEE . . . . . WISCONSIN

BRANCHES IN ALL PRINCIPAL CITIES

Preferred Flush Boxes Combine Quality and Low Price

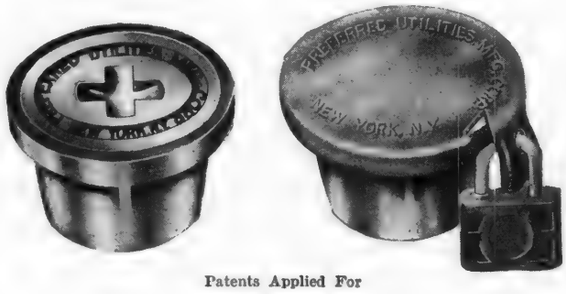
The Preferred Flush Box is a quality product which is priced lower than inferior boxes.

A heavily galvanized cast iron body, a brass cap and a specially treated gasket make the Preferred Flush Box water tight and fume proof.

The specially shaped locking key is designed to make simple the cleaning of the slot even if full of dirt or ice.

High grade in appearance, workmanship and material.

2″		3″	
Lots of 1	$1.35	Lots of 1	$2.70
" " 6	1.20	" " 6	2.40
" " 12	1.08	" " 12	2.16
" " 25	.99	" " 25	1.98



Patents Applied For

Large users write for price for flush boxes with your own name cast in caps.

The Preferred Flush Box can be converted into Lock Type Fill Box, an exclusive Preferred feature.

Conversion Covers for 2″ Boxes $.15 each net.
Conversion Covers for 3″ Boxes $.25 each net.

Preferred Utilities:

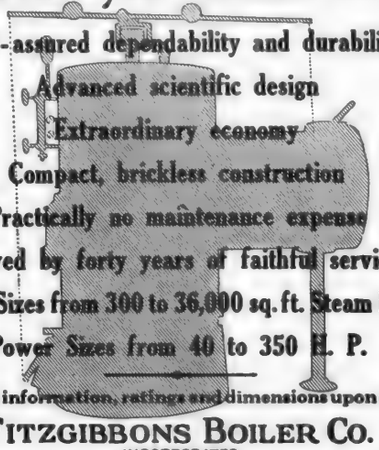
PREFERRED 100% AUTOMATIC DAMPER
PREFERRED FOOT VALVES
PREFERRED ANTI-SYPHON VALVES
PREFERRED DOUBLE TAPPED BUSHINGS
PREFERRED FLUSH BOXES
PREFERRED VENT PROTECTORS

Other Preferred Utilities are in our laboratory and on test in the field.

Exclusive Distributors for Absolute Con-Tac-Tor Corp., in New England, New York and Northern New Jersey. Complete stock carried in New York City.

PREFERRED UTILITIES MANUFACTURING CORP.
33 West 60th St., New York, N. Y.

FITZGIBBONS STEEL BOILERS
"The Boiler you can afford to own"



Steel-assured dependability and durability
Advanced scientific design
Extraordinary economy
Compact, brickless construction
Practically no maintenance expense
Proved by forty years of faithful service
Heating Sizes from 300 to 36,000 sq. ft. Steam Rating
Power Sizes from 40 to 350 H. P.

Complete information, ratings and dimensions upon request

FITZGIBBONS BOILER CO.
INCORPORATED
570 Seventh Ave., New York, N. Y.

H.T.P.

HEAT TRANSFER PRODUCTS

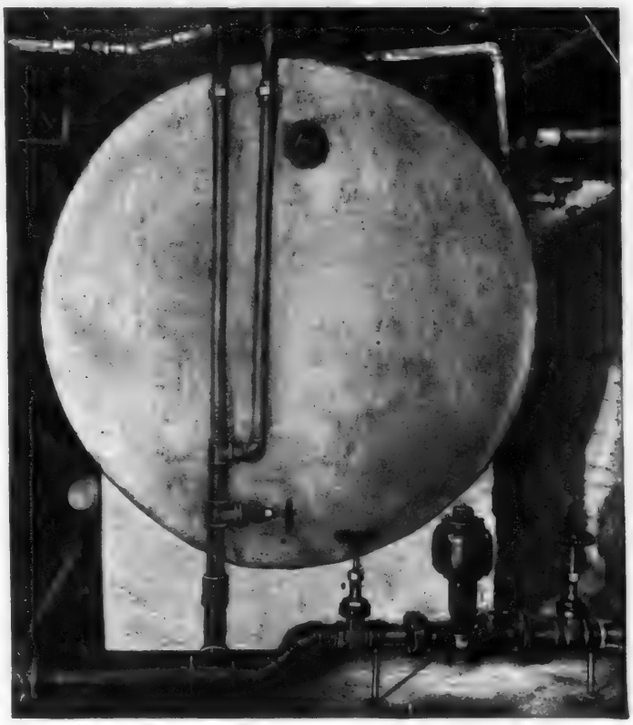
Designers and builders of general engineering equipment for

Power Plants
Chemical Plants
Oil Refineries
Gas Plants
Textile Mills
Refrigeration Plants
Air Conditioning
Laundries
Heating & Ventilating
Paper Mills, etc.

Also equipment for severe duty such as high pressures, high temperatures and unusual corrosive conditions . . . Complete engineering service furnished on any problem in these industries.

HEAT TRANSFER PRODUCTS, INC.
A Division of the
Staten Island Shipbuilding Company
90 West Street, New York, N.Y.

No More Circulation Troubles on Hot Water Heating or Service Water Systems



The HYDROLATOR in the above illustration is used with 2 Excelso heaters on a 2,000 gallon service water system in a Chicago park Field House.

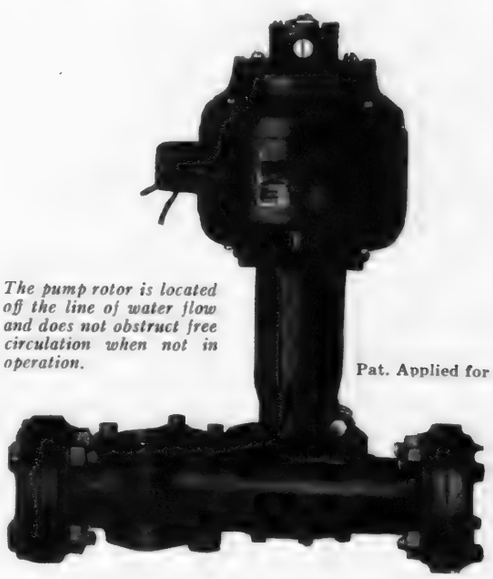
The HYDROLATOR *Eliminates Sluggish Circulation and Reduces Fuel Costs*

Solves Circulation Problems

The HYDROLATOR presents an easy solution for all your hot water circulation problems. It stimulates sluggish systems, eliminates short circuits and overcomes "traps." Provides rapid circulation regardless of whether the radiators are above, below or on a level with the boiler—an important feature in localities where homes are built without basements.

For Heating or Service Water Systems

The HYDROLATOR is used with equal success in stimulating the circulation on hot water heating or domestic service water jobs. Maintains practically a uniform water temperature throughout the system.



The pump rotor is located off the line of water flow and does not obstruct free circulation when not in operation.

Pat. Applied for

Manufactured by

Janette Manufacturing Company
556-558 West Monroe Street
Chicago

Singer Bldg.
149 Broadway
NEW YORK

Real Estate
Trust Bldg.
PHILADELPHIA

Mail Coupon for Prices and Full Information

HV9

JANETTE MANUFACTURING CO.,
556-58 West Monroe St., CHICAGO.
Gentlemen: Please send me prices and full particulars on the HydrolatoR.

Name .....
Company .....
Address .....
City .....
State .....

The Kane 8-H.P. boiler shown in this photograph is installed in the commissary of the Waldorf System, Inc., located at New Haven, Conn., where steam is supplied to jacketed kettles for cooking soups, meats, and vegetables.

Kane boilers are to be found in numerous restaurant supply depots and commissaries throughout the country, where cooking and baking is done for distribution to several restaurants in the same city.

The KANE (PATENTED) GAS STEAM BOILER

Whether steam is an important factor in your production costs, or a relatively small item, you will find the economy of The KANE to be convenience, and absolute dependability. Its use for the generation of *process steam* is always economical, but where used for isolated purposes or buildings, to take care of peak loads when pressure drags, to supply process steam where electric power is purchased, or to eliminate the care and expense of keeping the big boiler going all Summer long, The KANE is bound to prove an exceptionally profitable investment.

The KANE boiler is fully automatic, water supply as well as gas, thus assuring a minimum consumption of gas for the work done. Designed and built to meet the most exacting requirements, The KANE makes a lifelong booster of every new user. A profusely illustrated, easily read Bulletin will gladly be sent on request—write for your copy today and have it ready in your files for instant reference.

MEARS-KANE-OFELDT INCORPORATED

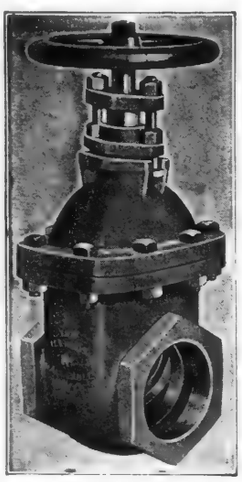
Manufacturers of

GAS BOILERS AND WATER HEATERS

1903-1915 EAST HAGERT ST. PHILADELPHIA

New York—9 Park Place
Boston—100 Arlington St.
Chicago—363 W. Erie St.
Buffalo—Walbridge Bldg.
St. Louis—2010 Locust Blvd.
Los Angeles—940 S. Maple Ave.
Birmingham—American Trust Bldg.

IRON BODY GATE VALVES

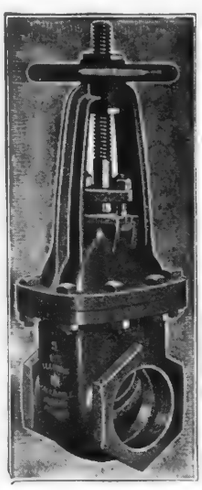


SCREWED, FLANGED AND HUB END STYLES

NON-RISING STEM AND O. S. and Y. PATTERNS

ALSO MANUFACTURERS OF

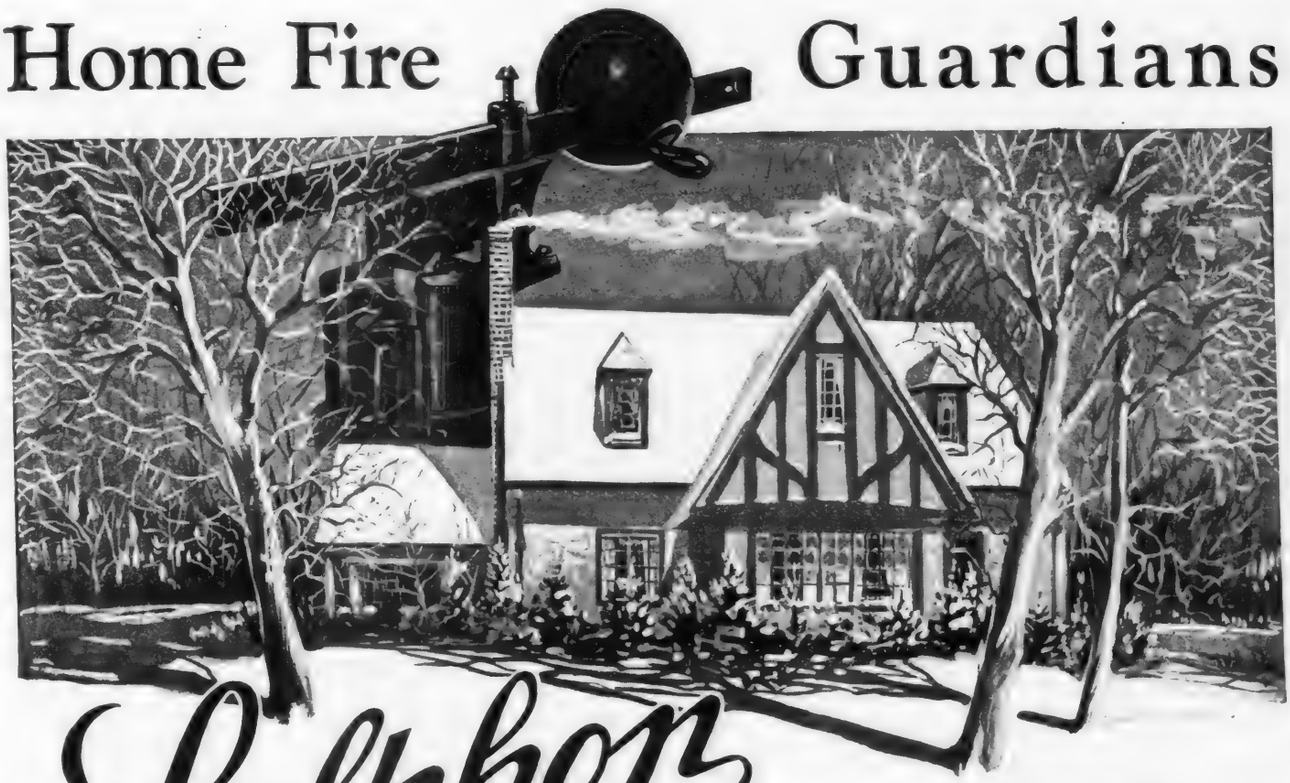
Cast and Malleable Iron Fittings



Illinois Malleable Iron Company

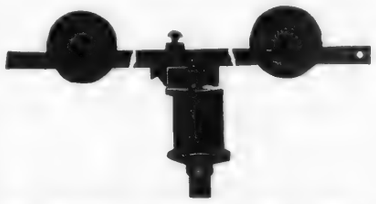
1801 Diversey Parkway :-: :-: Chicago, Ill.

Home Fire Guardians



Sylphon TRADE MARK Hot Water Damper Regulators

THEY are the pioneers of accurate automatic draft control. They provide ideal regulation of house heating water boilers. They save fuel and hat troublesome travel up and down cellar stairs to adjust drafts.



No. 46 Sylphon Hot Water Damper Regulator. Controls from 130 deg. to 200 deg. F. Length of bulb 1 inch; threaded 1-inch pipe size. May be screwed into boiler, laundry heater, or garage heater.

They afford even, lower cost heating. Their responsive action to the slightest changes in water temperature is constant and dependable, and their great durability makes them outlast the lifetime of the boiler.

There is a Sylphon Damper Regulator for Every Steam, Hot Water or Vapor Heating System

SEND FOR FULLY DESCRIPTIVE LITERATURE

Cut open view of No. 45-A Sylphon Hot Water Damper Regulator. Controls from 120 deg. to 220 deg. F. Length of bulb 2 inches; threaded 2-inch pipe size. Installed in a Y or screwed into boiler.

The Original and Only Genuine
SYLPHON BELLOWS

The motor element in all Sylphon Instruments is the most accurate, durable and flexible temperature control unit known to science.

THE FULTON SYLPHON COMPANY, *Knoxville, Tenn., U. S. A.*

Sales Offices: New York, Chicago, Philadelphia, Boston, Detroit. All Principal Cities in the U. S. DEPT. W

Gentlemen:

We are interested in Sylphon Damper Regulator for

_____

Name _____

Company _____

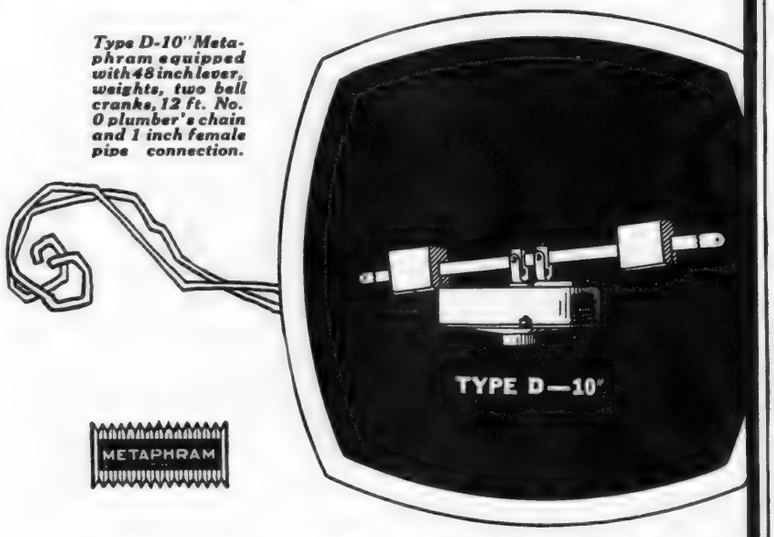
Address _____

City _____ State _____

THE FULTON SYLPHON COMPANY
Sylphon
AUTOMATIC TEMPERATURE CONTROL

For Pressure, Vapor or Vacuum Heating Systems

Type D-10" Metaphram equipped with 48 inch lever, weights, two bell cranks, 12 ft. No. 0 plumber's chain and 1 inch female pipe connection.



METAPHRAM

The Type D-10" Metaphram Damper Regulator has been especially designed for pressure, vapor or vacuum heating systems.

Its 10-inch discs are extremely sensitive to the slightest changes of pressure or vacuum. It has the additional advantage of self-collapsing discs, making it ideal for vacuum systems.

We will furnish the right size regulator for every job when you order a Metaphram and we will service them for you.

Let us send you the full details of Metaphram Damper Regulators—now

National Regulator Co.
2309 N. Knox Ave. Chicago, Ill.

NATIONAL METAPHRAM DAMPER REGULATOR

CAPITOL

HOT WATER

STA-PAK VALVES

Never Need Re-packing

Note the detailed construction of the Capitol STA-PAK Hot Water Valve illustrated above. Here is a real hot water valve of the packless type, extremely pleasing in appearance. For use on pressure or expansion systems. It is a valve that will give permanent satisfaction.

Every STA-PAK valve is made of guaranteed tested materials.

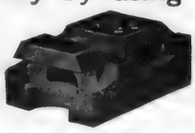
This is STA-PAK No. 24

CAPITOL BRASS WORKS
Division of Michigan Smelting and Refining Co.
MANUFACTURERS OF BRASS VALVES, BOILER TRIMMINGS AND PLUMBERS' BRASS GOODS
DETROIT, MICH.

CUT COAL BILLS

Pyramid Grates Do It

Owners of buildings of all types have cut their coal bills radically by using Buckwheat Coal.

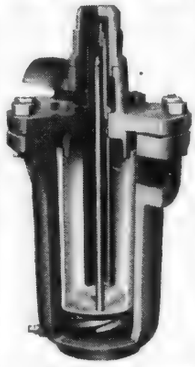


You can burn Buckwheat with PYRAMID GRATES

Let Us Send Full Details

PYRAMID IRON PRODUCTS CO.
230 East 41st Street New York City

Trerice Steam Trap



Revolving valve cleans seat and produces uniform wear on same.

High chrome steel valve and seat. Sent anywhere for free trial.

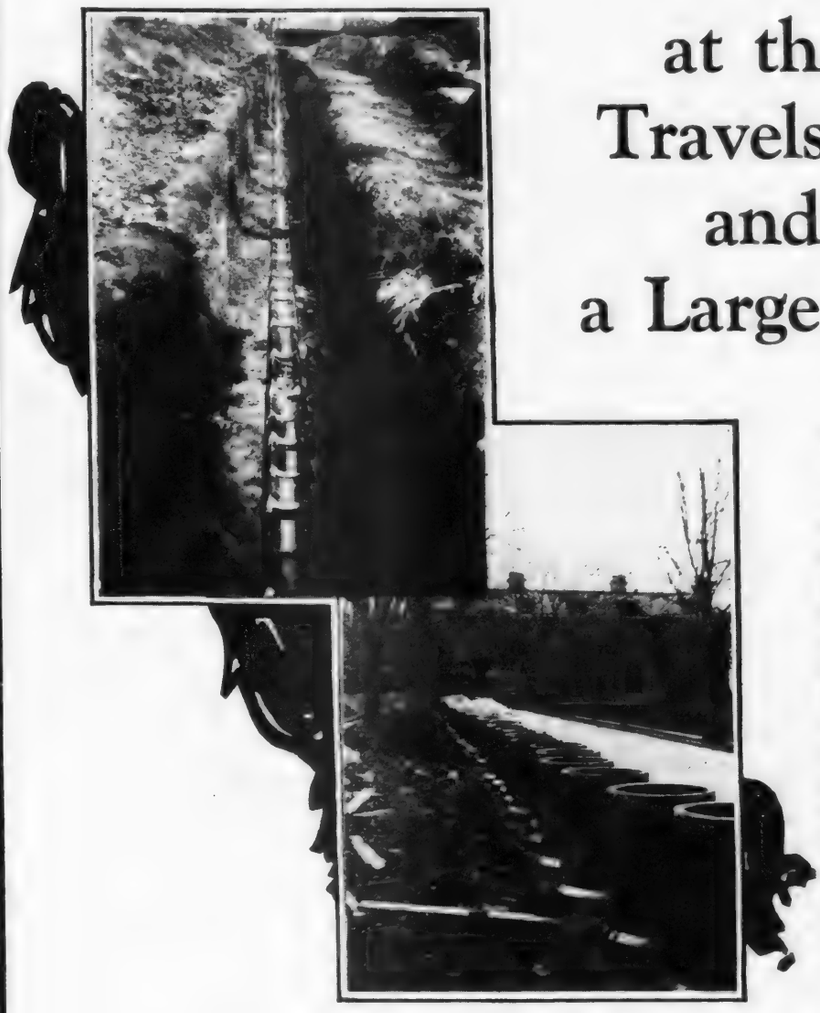
Some good territory still available. Liberal contracts. Stock sent on consignment.

Write for full particulars to

H. O. TRERICE COMPANY
1338 West Lafayette Blvd.
Detroit, Michigan

3 Ounces of Steam

at the Boiler Travels 700 Feet and Heats a Large Residence

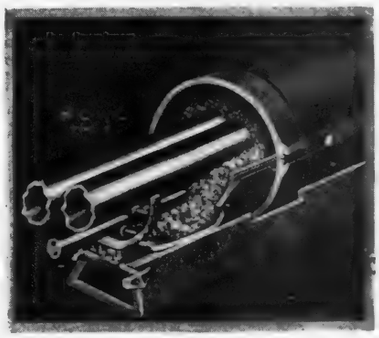


Illustrations show the Harkness Residence at New London, and a portion of the trench with Ric-wiL Conduit being installed.

THREE ounces of vapor at the boiler (not by pressure gauge at the residence) traverses 700 feet of supply pipe and proves to be sufficient to heat the huge Harkness residence, 3 stories high and about 150 feet long. It is obvious that only the highest efficiency could accomplish this. Heating system is by the Vapor Engineering Company, installed by Frank Poulding & Sons, Heating Contractors, New York City. Type F Ric-wiL Conduit, with Dry-paC Insulating Filler protects and insulates the pipes.

Write for detailed information and architectural and engineering data.

Ric-wiL Type F with Dry-paC waterproof filler packed around pipes. Type F is recommended for high or low pressure steam heating, high pressure and super heated power pipes, single or in groups of any number.



THE RIC-WIL COMPANY

Union Trust Building, Cleveland, Ohio

Offices in Principal Cities

RIC WIL
UNDERGROUND CONDUIT

Month after month home and prospective home-owners read about the Caloroil Line of Oil Burners thru magazines, newspapers, bill-boards and direct by mail advertising.

Stop Losing SALES

DEALERS after *large* sales of oil burners can't afford to lose many contracts. Here are Caloroil facts that help make many added sales. People don't *all* want the same qualities in a burner. Some ask price, some silence, some long life and low operation cost, and some low initial cost. Also, the same burner can't sell to 12-family apartments and 6-room bungalows.

Caloroil dealers offer a line of burners suitable for any type of installation. They satisfy more buyers. They close many more contracts. Sales are easier because the Caloroil-Lawrence May line is known, advertised.

The Caloroil "burner for every home, every purse" policy is multiplying sales, and dealers are profiting thereby. Get the facts.

Caloroil

BURNER CORPORATION
225 West 34th Street, New York City

CALOROIL BURNER CORPORATION
Department 8, 225 West 34th St., New York City.

Tell us about the Caloroil Line of Oil Burners.

*Name*_____

*Address*_____

We Want Dealers

Heating Contractors

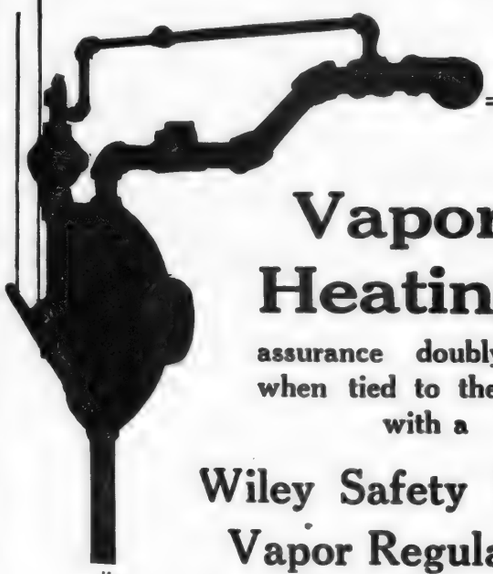
Do Big Business by Installing our **Baked Enamel Shields** and **Art De Luxe Cabinets,** as every radiator installation means a ready and almost **Certain Prospect** for the **Sale** of our **Shields** or **Cabinets.**

Architects

Continually specify and recommend our **Splendid Line** because **Circulation is Not Retarded** on **Account** of our **Construction** which permits of **Ready Circulation** of **Both Cold** and **Hot Air.**

Write for Prices and Dealer Agreement.

ACME RADIATOR SHIELD CO., Inc.
Manufacturers of "Modern" Radiator Furniture
48 and 50 Vine Street **Cincinnati, Ohio**



Vapor Heating

assurance doubly sure when tied to the boiler with a

Wiley Safety Vent Vapor Regulator

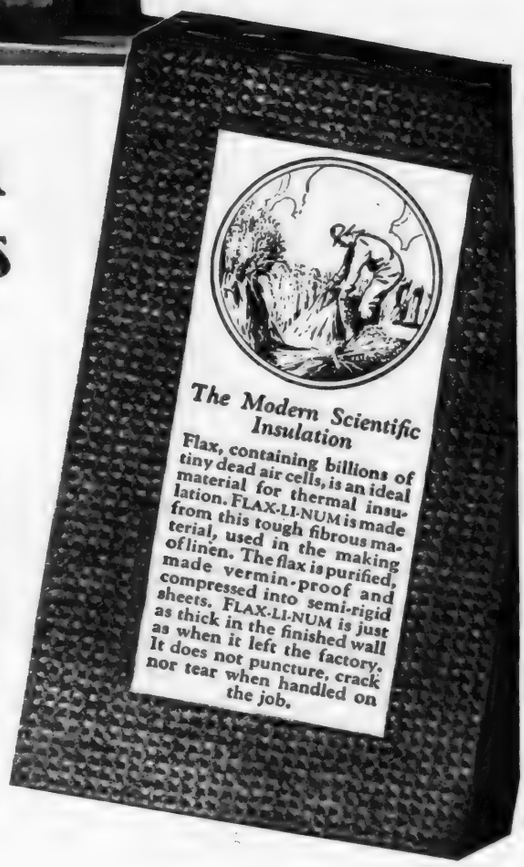
Write for your copy of booklet describing the Wiley line of vapor heating specialties.

peerless quality product manufactured and sold exclusively by

The Simplex Heating Specialty Co.
(INC.)
Lynchburg, - Va.

Mr. Bert Hene, Hene Construction Co., Omaha, was the builder of this splendid Flax-li-num insulated residence owned by Dr. Hyde in Omaha.

REFRESHINGLY COOL IN SUMMER FLAX-LI-NUM PLUS 2 AIR SPACES


The Modern Scientific Insulation
Flax, containing billions of tiny dead air cells, is an ideal material for thermal insulation. FLAX-LI-NUM is made from this tough fibrous material, used in the making of linen. The flax is purified, made vermin-proof and compressed into semi-rigid sheets. FLAX-LI-NUM is just as thick in the finished wall as when it left the factory. It does not puncture, crack nor tear when handled on the job.

AT no time of the year is insulation more important than it is in summer. FLAX-LI-NUM and the two-air-space method *builds* real comfort into your home.

The scientific soundness of this method of insulating by FLAX-LI-NUM is demonstrated by tests of the U. S. Bureau of Standards. These tests prove that ½-inch insulation, installed to form two air spaces in the walls, has the insulation value of ¾-inch insulation used as a plaster base or in contact with the sheathing.

In addition to its high insulation efficiency, FLAX-LI-NUM, applied by the two-air-space method, gives maximum results, using the least amount of material. FLAX-LI-NUM comes in ½-inch sheets, cut and shaped to go in the walls between the studs—and 1-inch sheets in one piece, ready to install in your roof. The ease of applying FLAX-LI-NUM and the fact that it comes already cut saves you money and gives you comfort with economy.

Send for facts about the two-air-space method of insulating homes.

FLAX-LI-NUM INSULATING CO., ST. PAUL, MINN.

Flax-li-num

A CORRECT BUILDING INSULATION AND SOUND CONTROL MATERIAL

FLAX-LI-NUM INSULATING CO.
St. Paul, Minnesota

HV-7

Send me results of U. S. Bureau of Standards tests of the two-air-space method of insulation. Also send complete information about Flax-li-num.

Name..... Address..... City..... State.....

THE MARSH THERMODISK LINE

When you want the best be sure that you specify Marsh Thermodisks—they are better.

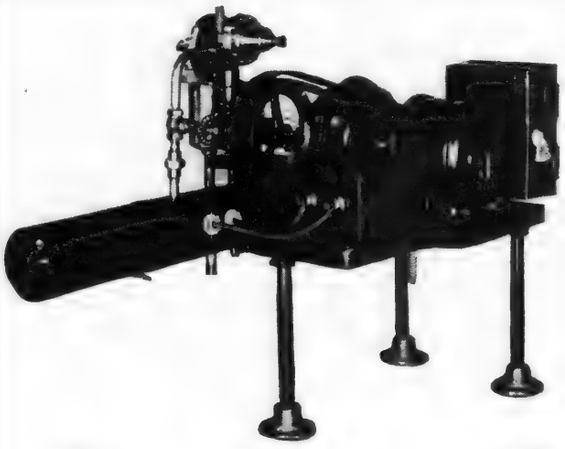
Our new heating catalog will tell you why—write for it today.

MARSH Thermodisk Valves and Vents are absolutely automatic.

There are no springs and nothing to get out of order. Can not water clog or stick.

Every Marsh Thermodisk is adjusted and tested before leaving our factory and is guaranteed against defect for five years.

JAS. P. MARSH & CO.
Established 1865
2073 South Port Avenue
CHICAGO, ILL.
Offices in Principal Cities



$395, *completely installed with 275-gallon tank*

A very low-priced, high-grade, mechanical atomizing burner.
Long discount from this price.
Electric ignition, extremely quiet operation.
Approved to burn 28 gravity oil.

York Automatic has become the leading burner in a number of cities.

Proof that our policy of building the finest burner possible to build, and then selling it to the trade for the lowest price possible, is the way to volume business and satisfactory profits for the distributor.

Nine years of building burners have permitted us to cut production costs, maintain quality, give sales and engineering assistance and still sell the York Automatic for little more than half the price of similar machines.

If you are at present selling burners, you need the York Automatic to round out your line of burners.

If not in the burner business, this gives you a splendid opportunity to make a connection with one of the fastest growing oil burner companies.

Specifications

Century motor
Webster transformer
Tuthill Pump
Contactor controls
Nozzle, strainers
Diaphragm oil regulating valves and all other parts York built

Write for further details and sales plan

YORK OIL BURNER COMPANY, 21 WEST CLARK AVENUE YORK, PA.

Speedily Applied Yet Fine in Appearance

Asbestocel Pipe Insulation Pleases Builders

TWO facts about Improved Asbestocel Pipe Covering recommend it chiefly to the wise plumber and heating contractor—

The first is—the speed with which his mechanics may apply it.

Because of its consistent roundness and hardness, a mechanic can apply Improved Asbestocel in much less time than the same mechanic could put ordinary air cell on the same run of piping. That saved time is money in your pocket.

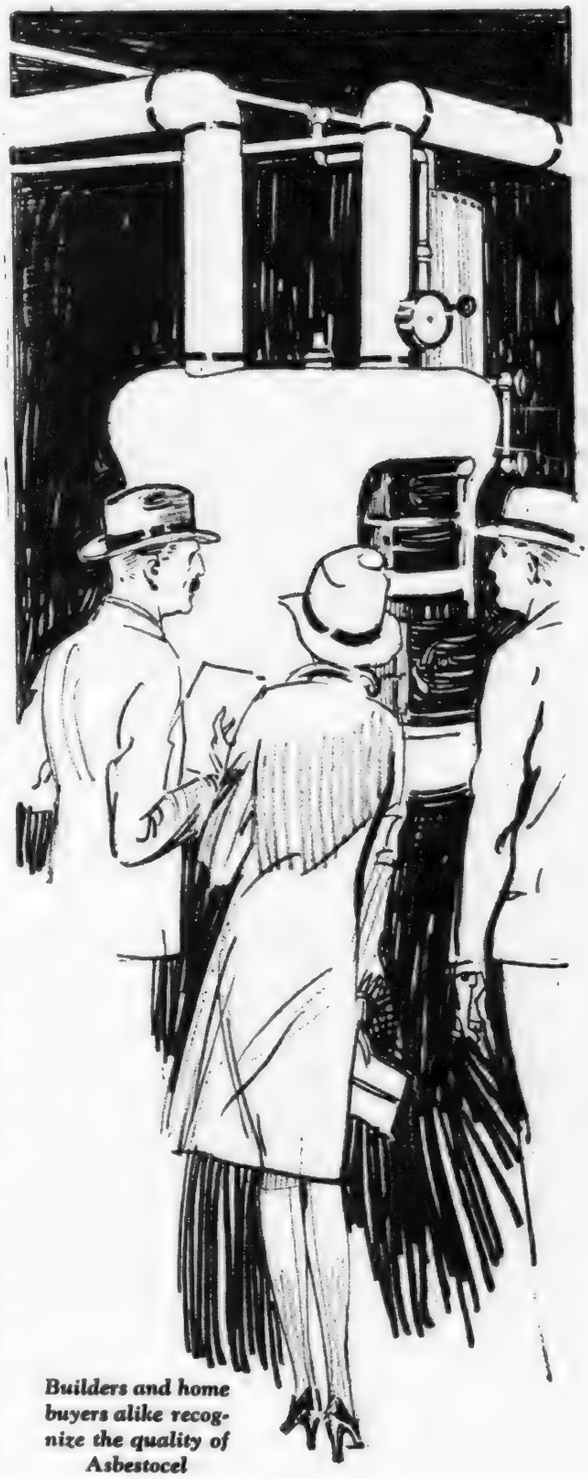
The second point is—the fine appearance of the finished job.

After all, your finished job either recommends you or tags you or your men as poor mechanics. The even roundness and the clear white color of Improved Asbestocel after it has been applied to the heating pipes of a new home are bound to add to your reputation as a careful workman. That counts heavily, particularly with the builder of houses for sale.

Price?—

Did you know that for the average house the difference in price between good Improved Asbestocel and ordinary air cell amounts to only about a dollar?

If you want more information, ask your jobber, or send the coupon to Johns-Manville Corporation.



Builders and home buyers alike recognize the quality of Asbestocel

MASTER *of* ASBESTOS

Johns-Manville

IMPROVED ASBESTOCEL

JOHNS-MANVILLE CORPORATION
New York, Chicago, Cleveland, San Francisco
Branches in all large cities
Canadian Johns-Manville Co., Ltd., Toronto
Please send me complete information about Improved Asbestocel Pipe Insulation.

Name.....

Company.....

Address.....

..... A-64-D

OIL HEAT—AS BENEVOLENT AS SUNSHINE

September is harvest month for Oil Heating Sales

WHEN summer draws to a close and the first cool breezes of Autumn are felt, home owners start thinking about oil heat. Whether their thinking remains just *thinking,* or is converted into *acting*—into *installing* the correct oil heating equipment for their needs is something that rests largely with you.

The prospects on your list regard you as an authority on oil heating. To reap your share of the September sales harvest you must justify their faith by keeping fully informed on all the new developments in the industry.

Oil Heating Institute's Service to You

In order to maintain your position as local headquarters for oil heating information and to be in the best position to judge the present oil burners on the market, get the full facts—told interestingly and pictorially in a series of booklets written by national authorities on oil heat.

These booklets are provided by the Oil Heating Institute as a part of its service to the public as the clearing house for information about the Oil Heating Industry. The coupon will bring the booklet in which you are most interested.

This is the Emblem of the *Oil Heating Institute*

It is the symbol of satisfactory public service in oil heating.

Only the manufacturers who are members of the Oil Heating Institute are permitted to use it.

These manufacturers have earned their membership through the enthusiasm of thousands of home owners whom they have provided with efficient and dependable oil heat.

This emblem protects you, and it will be protected, on your behalf, by the Oil Heating Institute.

The Oil Heating Institute is prepared to furnish special information on the heating of churches, theatres, hotels, apartment houses and office buildings, and on the various heat treating processes of industry.

OIL HEATING INSTITUTE

420 Madison Avenue New York

Check the book you want

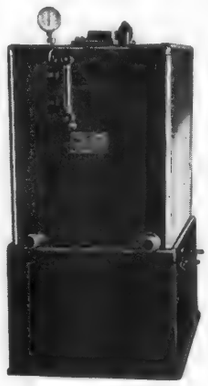
MAIL THE COUPON TODAY!

OIL HEATING INSTITUTE H. & V.-9
420 Madison Ave., New York City

Please send me, free of charge, the following information on oil heating equipment:

Does it Pay to Install an Oil Heater?.....
Are Oil Heaters Perfected?
What About the Supply of Oil Fuel?.....
Making Better Use of the Basement.....

Name .....
Address .....
City .....State.....



OIL AND GAS BURNING BOILERS

BRYAN

HEATING engineers throughout the country are universal in their opinion that the BRYAN BOILER is essential to utmost efficiency in burning Oil or Gas. Users everywhere are effecting a savings on their oil bill of from 30 to 50%.

This fact alone should prove to the alert dealer that there is an ever increasing market for BRYAN BOILERS. The merchandising of this boiler is exceptionally easy. It isn't hard to convince a man when you can assure him that his oil bill will be decreased 30 to 50%.

The complete story of the construction and operation of BRYAN BOILERS is very interesting to those in the heating trade. Write us TODAY and we'll send it along.

BRYAN STEAM CORP.

PERU INDIANA

Practical Help in Figuring Heat Losses

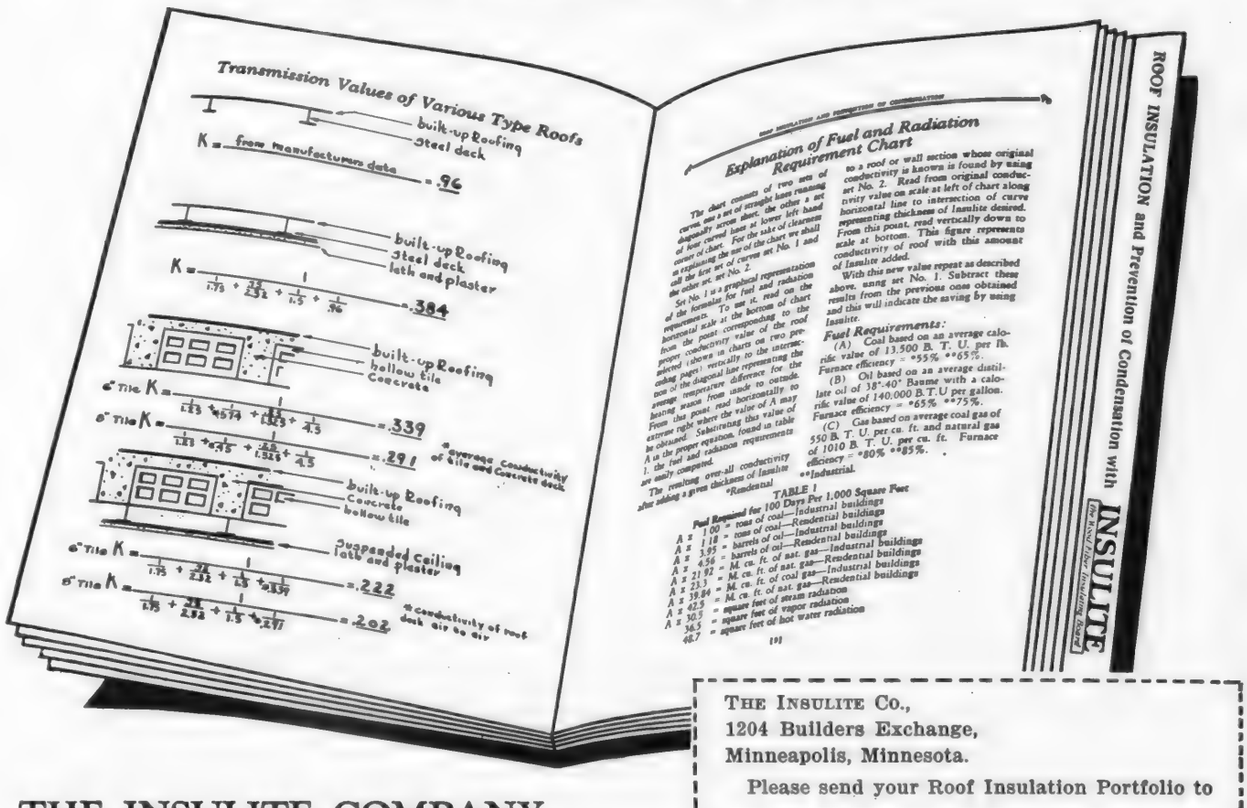
When you figure heating and ventilating installations you will find the INSULITE portfolio on Roof Insulation and Prevention of Condensation exceedingly helpful.

A copy of this portfolio—or more if you need them—will be sent on request.

The solution of the insulation problem at the time the heating requirements are figured is very essential. The INSULITE portfolio contains tables and charts which will be of real assistance in this connection. Write for it today.

INSULITE

the Wood-Fiber Insulating Board



THE INSULITE COMPANY
1204 BUILDERS EXCHANGE
MINNEAPOLIS MINNESOTA

THE INSULITE Co.,
1204 Builders Exchange,
Minneapolis, Minnesota.

Please send your Roof Insulation Portfolio to

Name.....

Address.....

City.....State.....

TORIDHEET
OIL BURNER
FOR BETTER HOME HEATING

Equipment is easily installed. Free from profit-stealing, time-wasting service calls. Listed as standard by the Underwriters' Laboratories. Approved by New York Board of Standards and Appeals and by Massachusetts Board of Public Safety.

Comparisons are *obvious*— in favor of TORIDHEET!

COMPARISONS are *obvious*—that is, obviously in favor of TORIDHEET Burners. Why? Because any comparison shows that the qualities of this remarkable burner are *better.*

First of all, it's noiseless—as "noiseless as a cat's tread" as one dealer pithily puts it. Then, it's completely automatic in operation—never a worry about it's getting "out of kilter."

It's Super-safe—that's the best way we know how to say it's "fool-proof."

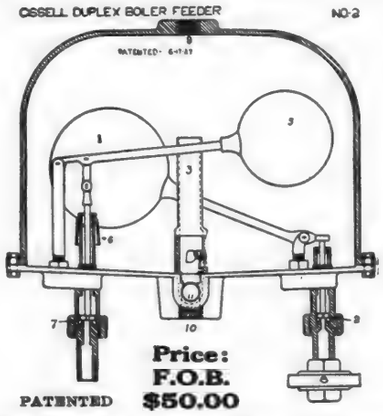
And—it's economical. No need to take our word for this feature—just ask any one of hundreds of satisfied users. *They know.*

The irritating hum, the constant whine of ordinary burners are unknown to TORIDHEET. Generates a clean, quiet flame. Combustion as clean as a hound's tooth. The price is right. So is our plan for dealers. Exclusive territory is being snapped up—write today.

CLEVELAND STEEL PRODUCTS CORPORATION
Madison at W. 74th St. · Cleveland, Ohio

Now is the Time
For Real Boiler Protection
While Also Increasing Its Efficiency

CISSELL DUPLEX BOILER FEEDER NO-2



PATENTED

Price: F.O.B. $50.00

This Duplex feeder, built especially to meet conditions existing in heating boilers, will make your boiler absolutely automatic, eliminating danger of burning boiler or cracking sections. In selecting a boiler feeder you want the best; thousands of these feeders are in use and never a complaint. So sure are we as to its efficiency, that we sell it with an ABSOLUTE GUARANTEE.

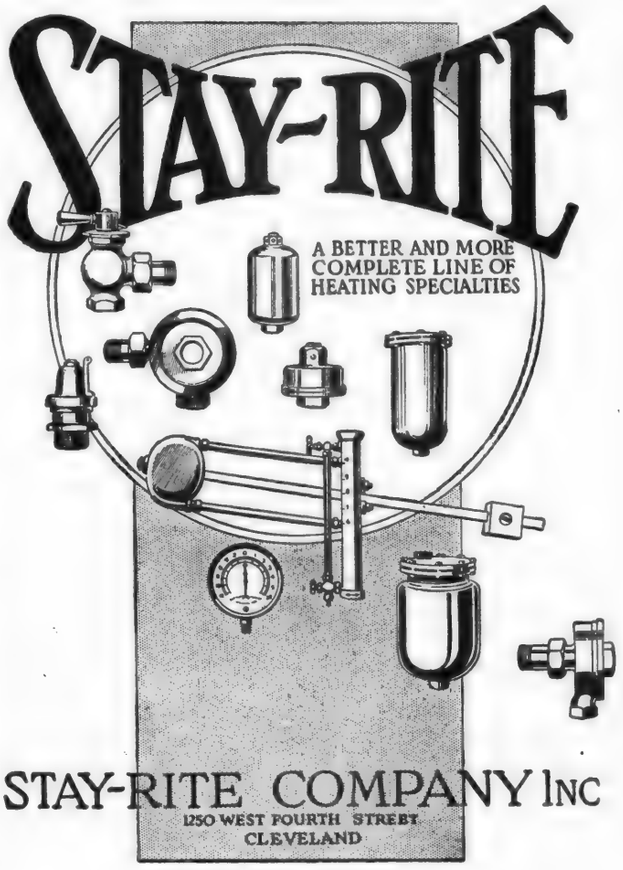
Write for Full Particulars and Discount

Manufactured by

W. M. CISSELL MFG. CO., INC.
111 South Second Street LOUISVILLE, KY.

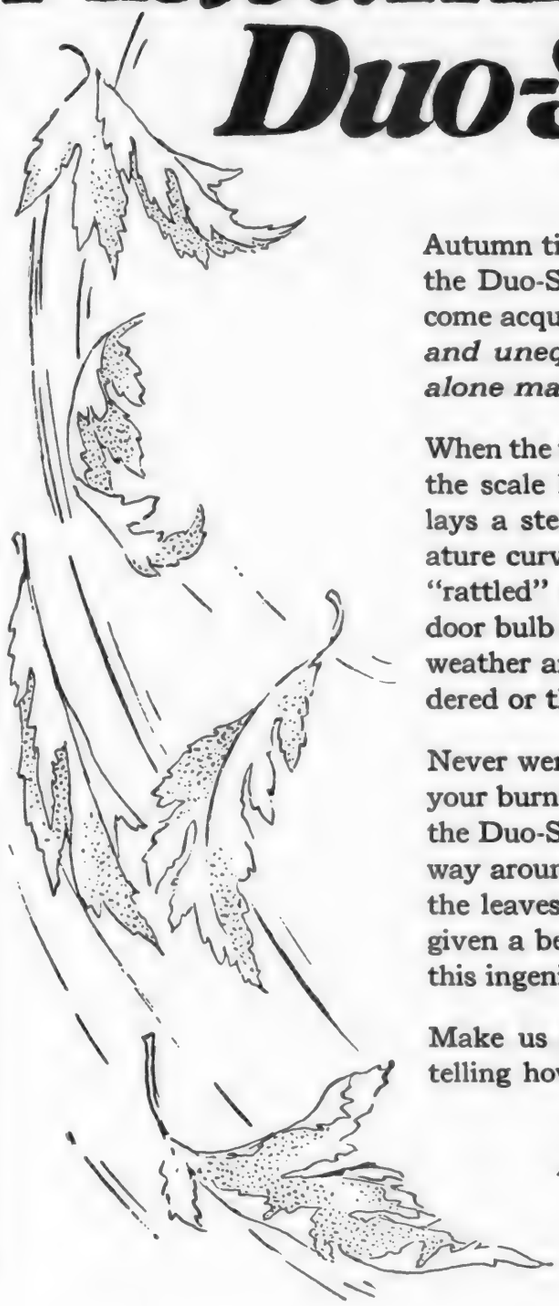
STAY-RITE

A BETTER AND MORE COMPLETE LINE OF HEATING SPECIALTIES



STAY-RITE COMPANY INC
1250 WEST FOURTH STREET
CLEVELAND

Autumn time is *Duo-Stat* time!



Autumn time is not only the best time to *sell* the Duo-Stat—it is also the best time to become acquainted with the *big saving of fuel and unequalled heating comfort that it alone makes possible.*

When the temperature is running up and down the scale like a flute obligato, the Duo-Stat lays a steadying hand on the room temperature curve. When the room thermostat gets "rattled" and gives out false alarms the outdoor bulb of the Duo-Stat takes a look at the weather and calls a halt before fuel is squandered or the home is overheated.

Never were you given as great aid in putting your burner a step ahead of competition as in the Duo-Stat. Never were you given as sure a way around the kicks that bob up every time the leaves begin to fall. And never were you given a better money maker than is found in this ingenious instrument.

Make us prove it. Send coupon for booklet telling how and why.

A few good territories still open to progressive representatives

Only the
DUO-STAT—

1. Avoids hot and cold radiator nuisance.
2. Gives uniform temperature near windows and radiators as well as at the thermostat.
3. Eliminates overheating under all conditions.
4. Eliminates the uncomfortable condition known as "cold 70."
5. Pays for itself in fuel saved—and then pays a dividend.
6. Makes the regulation automatic in *fact* as well as in name.

F. I. RAYMOND COMPANY, BUILDERS BLDG., CHICAGO
Originators of Automatic Dual Heat Control

The Raymond
WEATHER COMPENSATING DUO-STAT

If it hasn't a Duo-Stat —it isn't fully automatic

Please send booklet giving the how and why of the Raymond Duo-Stat.
Company_____
Individual_____
Street and Number_____
City and State_____
Mail to F. I. Raymond Co.
Builders Building
Chicago

H&V9

Now! Year 'Round Domestic Hot Water Supply!

Economical—Automatic—Highly Efficient

THIS one feature alone often decides the buyer's mind in favor of JOHANSON, THE COMBINATION TRIPLE-SERVICE BOILER. It guarantees a constant, ample supply of hot water the year 'round for homes, apartments or public buildings.

Parallel copper coils, submerged in the water chamber of the boiler directly above the crown sheet (where the highest temperature is always obtained) furnish an abundant supply of hot water at minimum cost.

Summer operation requires only a small oil flame operating intermittently at infrequent intervals. Scarcely if any more fuel is required than is needed for an independent water heater.

(Patented Feb. 8, 1927. Beware of infringing imitations)

The 1250 ft. (steam) size. Fired with Oil Burner of standard make, operating at 102.4% of its rated capacity, developed—

Over All Efficiency	81.92%
Average CO_2	11.6 %
Quality of Steam	99.45%
Average Stack Temperature	352.4°

NOTE—Above figures taken from report of one of a series of official tests conducted by accredited Engineers of Armour Institute of Technology, June 22 and 23, 1928. We will gladly send you copy of complete report on request.

Note these Five Specific Advantages: 1. SAVES EXTRA EQUIPMENT—Eliminates separate water heater. 2. SAVES FUEL—From 10% to 50% is saved in fuel cost over the operation of a separate heater during the period of a year. 3. SAVES SPACE—Heating unit is built into boiler and is self-contained, no added floor space being required. 4. SAVES INVESTMENT—No separate heater to buy or maintain. 5. SAVES TROUBLE—Fully Automatic the year 'round on oil burner installations.

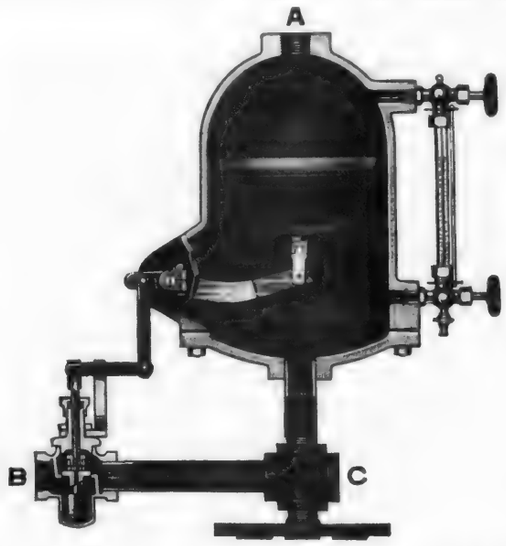
Operating Economy, Full Heat Utilization and the TRIPLE-SERVICE Feature (1. Heat. 2. Year 'Round Automatic Domestic Hot Water. 3. Garbage Incineration.) make this the preferred boiler the country over.

Considering Fuel Economy, Convenience and Utility this boiler will cost less at the end of a season's use. Thereafter, it becomes a splendid paying investment and you never heard of a fuel economizer being used on it. It is designed and built especially for fuel oil. Steel welded and constructed to A.S.M.E. code specifications.

Agency Proposition, Prices and Literature Sent Promptly Upon Your Request! Write today!

COMBINATION BOILER COMPANY
BENTON HARBOR, MICH.

TRIPLE SERVICE COMBINATION BOILERS — **COMBINATION TRIPLE SERVICE BOILERS**



Control the condensation level in return lines with a Kieley Water Line Governor. This governor insures quiet return lines and even vacuum pump operation.

KIELEY & MUELLER, INC.
34 West 13th St., New York City

Corrosion Protection

IS THE SOLE PURPOSE OF

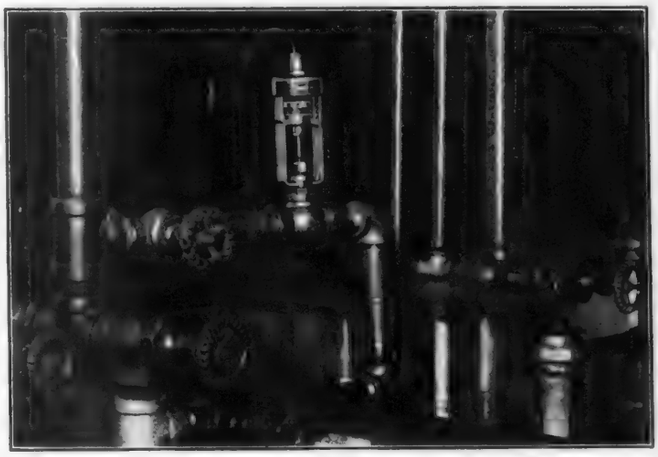
The Hickman Air Separator

Low in Cost—Easy to Install—Maintenance Nil—Certainly Worth Investigating

Write for Bulletin No. 3

WESTERN ENGINEERING CO.
215 Market Street
SAN FRANCISCO CALIFORNIA
Agents in Principal Cities

Close Temperature Control—Do You Know What It Means?



There are some who have never heard of controlling the temperature of hot water closer than about 10° F. That's because they always thought closer regulation wasn't necessary. And previously ordinary Temperature Controllers couldn't do much better anyway.

If you figure out how much can now be saved—in steam alone—by automatically regulating the temperature to within one or two degrees, you will find it will pay to install an American Precision Controller.

American Indicating Thermometer in cast brass case and plate glass front. Monel bulb chamber. Standard ranges from minus 40 to 1000° F. Accuracy guaranteed to within 1%.

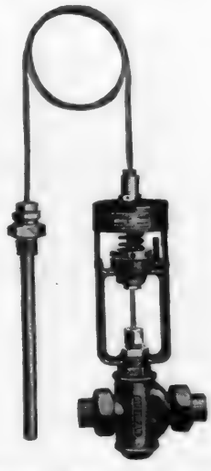
Test one yourself. Give it a thorough trial. There's no obligation. You will not be expected to keep it unless you are completely satisfied. It will control temperatures to within 1° F., if operating conditions are favorable.

AMERICAN INSTRUMENTS

SINCE 1851

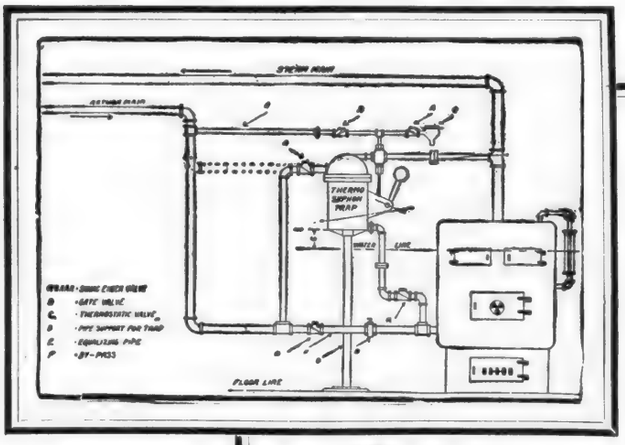
Specify Catalogs Desired

Indicating Gauges	A-14
Recording Gauges	E-14
Gauge Testers	D-14
Safety & Relief Valves	U-14
Tachometers	K-14
Glass Thermometers	F-14
Dial Thermometers	G-14
Recording Thermometers	H-14
Temperature Controllers	R-14



American Precision Temperature Controller. Simple. Rugged. Self-Operated. Accurate. With favorable conditions, regulation within 1° F. will be maintained constantly.

CONSOLIDATED ASHCROFT HANCOCK CO. INC.
AMERICAN SCHAEFFER & BUDENBERG DIVISION
338 Berry Street Brooklyn. N.Y.
Branches in Principal Cities



Application of Thermo Syphon Trap, showing proper method of piping, for draining any heating system.

For draining vapor, vacuum or any system *without pressure on the returns*, the return line may be run direct to inlet of trap as shown by dotted line.

For All Types of Steam Heating Systems

THERMO SYPHON TRAP

Lengthens the Life Line of Your Boiler

The life of a boiler depends a great deal upon the treatment it gets. The Thermo Syphon Trap will lengthen its life and prevent the necessity of costly replacements.

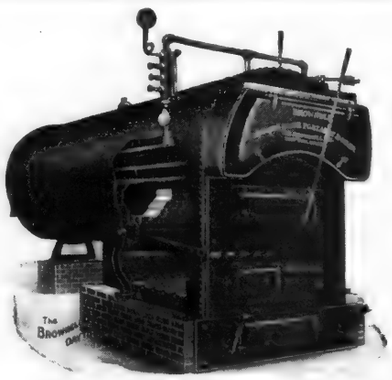
All condensation is returned to the boiler, maintaining the water line, regardless of pressure or vacuum. Operates on any one or two-pipe steam heating system. Used with success on the various prominent patented vapor, vacuum, atmospheric and modulation systems. Will also put life in old heating systems.

Send for Bulletin No. 16-HV, giving full details.

LYTTON MANUFACTURING CORPORATION

FRANKLIN, VIRGINIA

HIGH GRADE Return, Vacuum, Lifting and Separating Steam Traps, Reducing Valves, Blow-off Valves



Brownell Portable Smokeless Boiler

Brownell Boilers Are Riveted Steel Boilers

No material, other than steel, could possibly measure up to Brownell's standards. Nor would Brownell jeopardize a reputation of 73 years' standing by attempting the substitution of any other material.

Prospective builders, architects, engineers and contractors should keep posted on "what's what" on the Brownell line.

Brownells comply with ASME and all state codes. Sales Representatives everywhere—ready to serve. Bulletin B6A ready to mail.

The Brownell Company, Dayton, Ohio

Established 73 years ago.

BROWNELL

GRADON MANUFACTURING COMPANY

Heat Exchange Equipment

Expansion Joints — Separators

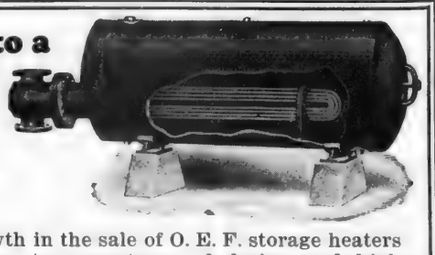
ENGINEERED Gradon PRODUCTS TRADE MARK

Engineering Dept.
Land Title Building

General Offices and Plant
East Tioga and Memphis Sts.

PHILADELPHIA, U. S. A.

Built up to a standard —not down to a price

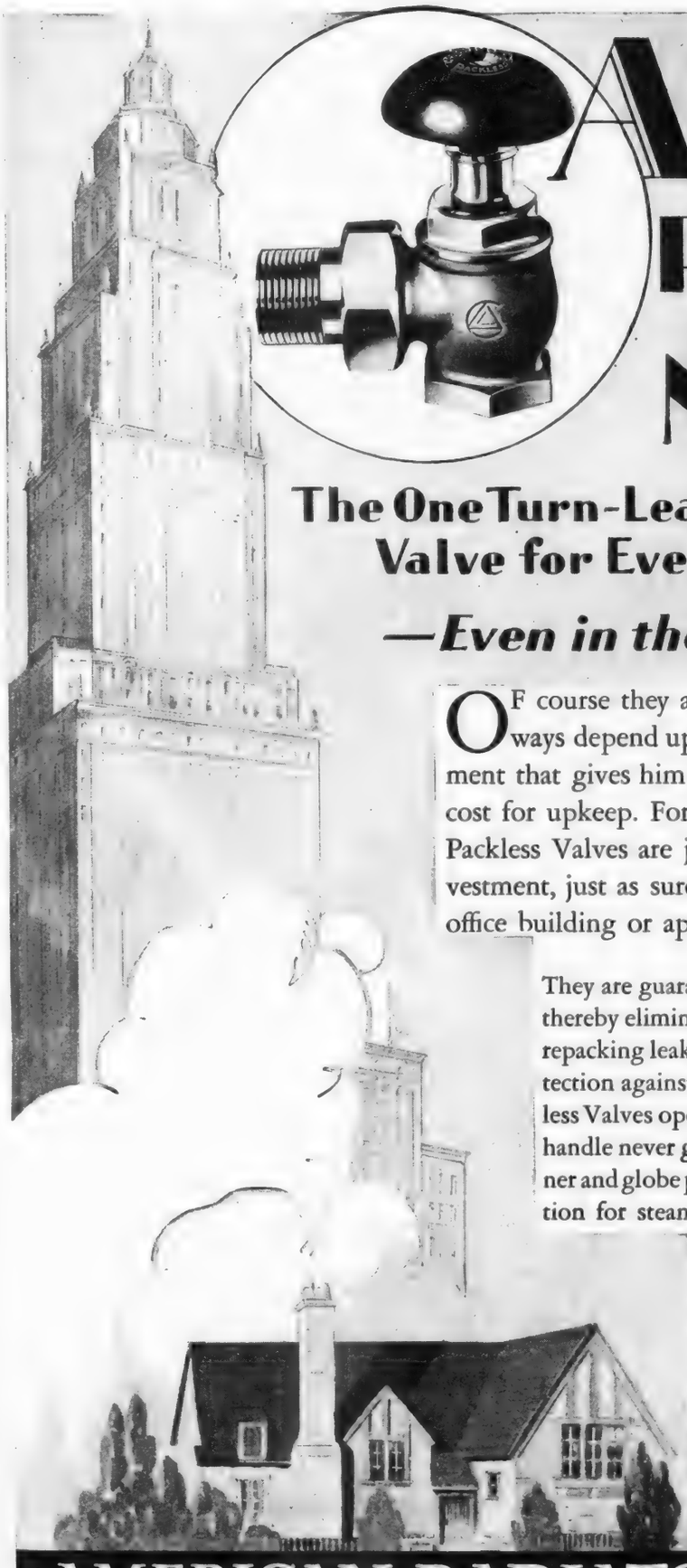


The rapid growth in the sale of O. E. F. storage heaters bears testimony to correctness of design and high standard maintained.

U-tube and straight tube types; steel flange quality; heavy gauge seamless drawn copper tubes; expanded into rolled steel tube sheets. Write for further details.

O. E. Frank Heater & Engineering Co., Inc.

Factory and Offices at Buffalo, N. Y.



ARCO Packless No. 999

The One Turn-Leak Proof-Low Cost Valve for Every Radiator

—*Even in the Modest Home*

OF course they are used in skyscrapers—you can always depend upon the big builder to install equipment that gives him the most for his money and lowest cost for upkeep. For the modest small home, too, Arco Packless Valves are just as suitable, just as good an investment, just as surely an economy, as in the towering office building or apartment.

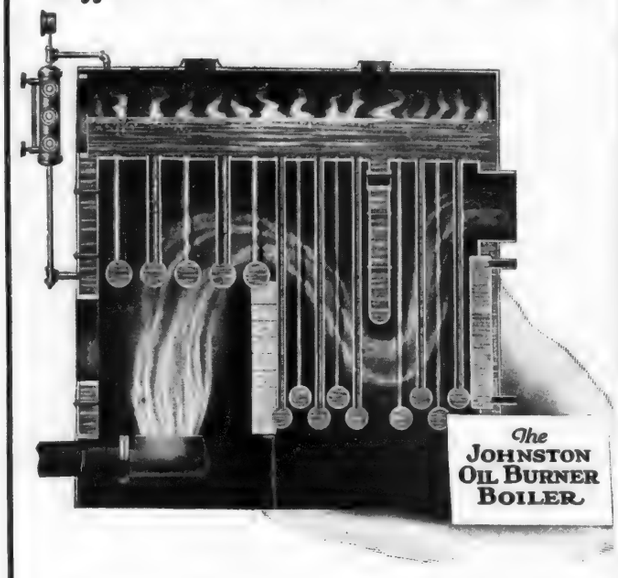
They are guaranteed not to leak or to need repacking, thereby eliminating not only the expense of frequently repacking leaky valves, but also insuring complete protection against damage to floors and rugs. Arco Packless Valves open or close with one smooth turn and the handle never gets too hot. They are made in angle, corner and globe patterns of wheel or lever handle construction for steam, water, vapor or vacuum installations.

For either new jobs or modernizing old ones, Arco Packless Valves No. 999 are an essential part of the most modern heating equipment, whether in lofty skyscraper or modest dwelling—and the first cost, which is also the *last* cost, is but very little higher than for the old style packed valves.

AMERICAN RADIATOR COMPANY

ACCESSORIES DIVISION, DEPT. PV-79, 40 WEST 40th STREET, NEW YORK, N. Y.

THE JOHNSTON OIL-BURNER-BOILER
Offers You Greater Success



Greater Sales Success in the oil-burner field is in store for you if you tie up your oil-burner business with the Johnston Oil-Burner-Boiler. The Johnston Boiler assures the highest heating satisfaction at the minimum fuel cost. That's why it opens the doors to more oil-burner sales—one sale leads to another. If you want to make your business grow, write today for catalog and complete proposition.

JOHNSTON BROTHERS, Inc.
FERRYSBURG, MICHIGAN

SEND FOR COMPLETE CATALOG

JOHNSTON BROTHERS, Inc.,
Ferrysburg, Michigan.

Please send us a copy of your catalog and information concerning your special dealer proposition.

NAME.....

ADDRESS.....

CITY..... STATE.....

B&J

The Sign of Quality

Quality Pays

There is very little difference in dollars and cents between the price of the *best* heating system and those not so good. QUALITY does cost more than mediocrity, in a heating system as in other things—but it PAYS—in comfort and convenience, in fuel economy, in quietness, in efficiency of operation and permanency. *Buy the best!*

Barnes & Jones

Modulation Vapor and Vacuum Heating Systems of Proven Quality

128 Brookside Ave.,
Jamaica Plain, Boston

101 Park Avenue,
New York City

This Float Valve won't leak

Only in the Davis Float Valve do you find this perfected, tight-closing disc—the distinctive feature that absolutely prevents leaking. Positive action is absolutely necessary in this valve's service, maintaining a constant water level in tank or reservoir. Its frictionless operation is another important feature. There is no packing. The inner valve and piston are loosely fitted —action is free—it cannot stick.

Accurate regulation and certain protection are assured with Davis construction and design. The catalog gives the detailed description.
Send for your copy.

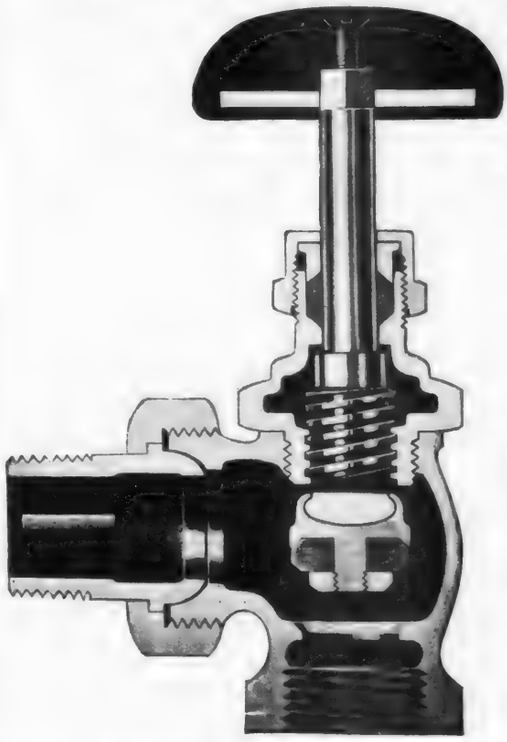
G. M. DAVIS REGULATOR CO.
436 Milwaukee Avenue
Chicago, Ill.

H & V 9-Gray

Something Entirely New

MARSH SPECIAL CONE DISC STANDARD RADIATOR VALVE

A Strictly High Pressure and 100% Quality Radiator Valve at Popular Competitive Prices



All Material, Workmanship and Finish are the Same as for Our Regular Packless and Modulated Lines.

Please Note Construction

Cone Disc; Bevel Seat; Lift; Drainage; Large Stem Diameter; Quick Opening; Overhanging Bonnet Hexes and Full-Sized Packing Chamber with Gland Follower.

All Important and Valuable Points

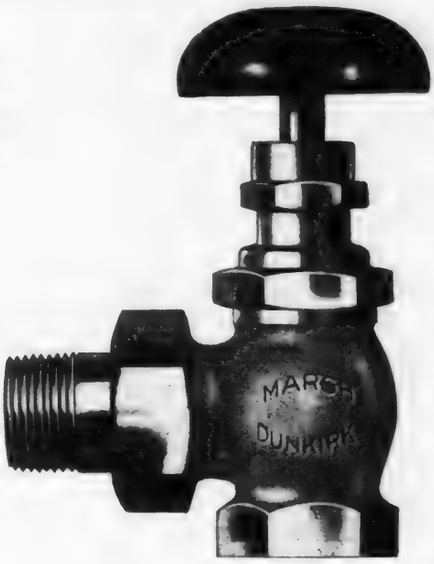


Fig. 150—Angle
Fig. 250—Globe
Fig. 350—R. H. Offset
Fig. 450—L. H. Offset
Fig. 550—Back Offset

Radiator Valve EFFICIENCY and ECONOMY depend upon TWO VITAL POINTS

FIRST: Seal against leakage through Valve Seat, and
SECOND: Against leakage of steam, water or gases from system through bonnet or around valve stem; further against the taking in of air in a vacuum system, through stuffing-box nut.

NOW, AS TO THE FIRST POINT

Marsh Cone Discs will not crack, or Valves leak through seat.

NOW, AS TO THE SECOND POINT

We call particular attention to the **full sized packing chamber with gland follower,** THE STRONGEST HIGH PRESSURE CONSTRUCTION USED FOR MILL SUPPLY OR POWER VALVES.

Leakage through Valve seat or around Valve stem, either out or in, is **lost efficiency and increased fuel cost.**

These Valves will not leak at seat or around stem.

EVERY VALVE IS FULLY GUARANTEED

MARSH VALVE COMPANY

DUNKIRK **NEW YORK**

General Sale Distributors

Edward T. Hetherington
1709 Sansom St., Philadelphia

Appleton & Liptrott, Inc.
1480 Broadway, New York

John W. Mabbs
431 So. Dearborn St., Chicago, Ill.

United States Radiator Corp'n
General Offices: Detroit, Mich.

SARCO COMPANY, Inc.
183 Madison Ave., New York

Taylor-Forbes Company
Canadian Agents Guelph, Ont.

How Central Stations "Eat Their Cake and Keep It"

Hornung "Master Control Valve" motor operated directly by thermostat. All relays eliminated.

The more customers you have, the less you lose when you lose *one*.

Put more customers on your lines, without increasing your overhead! The Hornung "Master Valve" Control, installed in the buildings you heat, will do two things:

1. Make customers better satisfied by cutting down their bills—because it will stop all *waste* of heat.
2. Give you more heat—that which is now *wasted*—with which to serve more customers.

That's how you can "Eat your Cake and Keep it"—keep all your present customers, please them better, add more customers, make your position stronger—and all with the *same output* that you are now producing.

Ask us to *prove* it to you.

"Heat lost is money lost."

CENTRAL HEAT APPLIANCES

J. C. HORNUNG
Engineer

3569

343 S. Dearborn St., Chicago, Ill.

Save ½ Your Coal Bill

Write for booklet containing complete details and list of prominent installations giving satisfactory service.

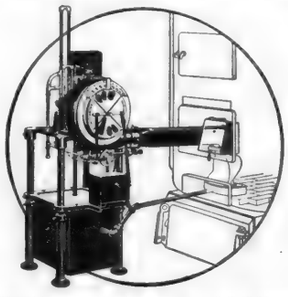
Sole Distributors in United States and Canada

WITH COPPUS UNDER-GRATE DRAFT BLOWER

REGISTERED COPPUS U.S. PAT. OFFICE

The COPPUS is a scientifically constructed, coal burning blower designed to burn any grade of coal. Its installation necessitates no change in grates. Hundreds of satisfactory installations in homes, schools, churches, office and public buildings.

INTERNATIONAL FUEL SERVICE CORP. BRIDGEPORT, CONN.



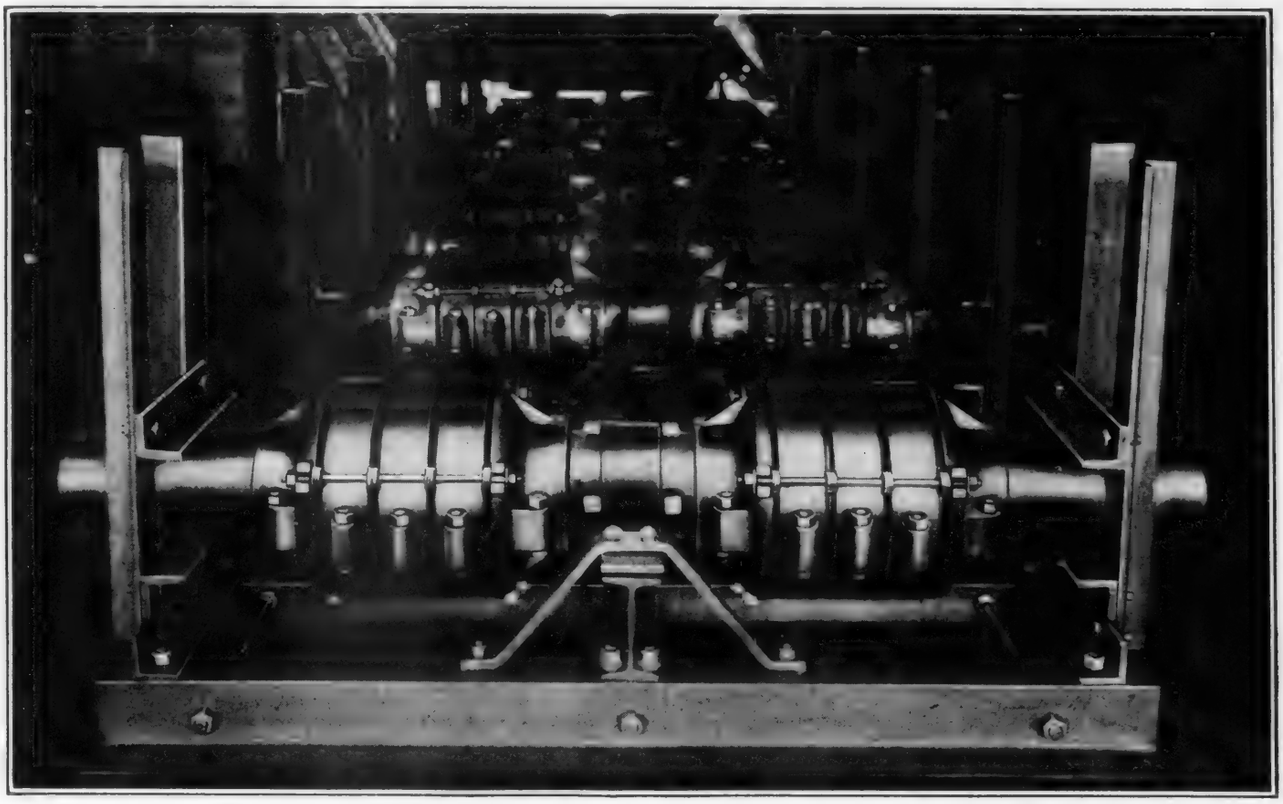
Continuous Flame Dependable Heat

No Gas Pilot • • *No Electric Ignition*
Graduated Automatic Control
Mechanical Draft

McILVAINE OIL BURNER
Listed by Underwriters

Distributors—Write for the 1928-29 Sales Plan

McILVAINE BURNER CORPORATION
Dept. H • 749 Custer Ave. • Evanston, Ill.



Arrive assembled—ready for installation

BADGER

Double Self-Equalizing Welding Expansion Units

(Complete with anchor, guides and service outlet)

The units are anchored and guided by a structural steel base which may be either bedded in a concrete block or bolted to a concrete foundation. The open pipe ends may then be welded into the line. There is plenty of room to do this properly, inside of the trench. Note that the expansion elements are one-piece corrugated copper—and that no slip joints or packing are used. The heavy external equalizing rings distribute the movements evenly among all the corrugations, thereby insuring long life, and maintained flexibility.

Write for Bulletin

BADGER ENGINEERING SERVICE

Badger engineers are designers, manufacturers and installation experts for the following and kindred power plant products: Pipe Bends, Chemical Apparatus, Copper and Sheet Metal Work, Copper Boilers.

E. B. BADGER & SONS CO., 75 Pitts Street, Boston, Mass.

New York: 271 Madison Ave. ***Representatives in all principal cities*** **Chicago: 2831 South Parkway**

BADGER EXPANSION JOINTS

ESTABLISHED 1841 · WEATHER VANE ON FANEUIL HALL · TRADE MARK · E.B. BADGER & SONS COMPANY

Give Owners

dependable
low-cost **HEATING**
silent

Wing Blowers Burn Low-Cost Coal

This fine hotel uses boilers equipped with Wing Blowers, and burns low-cost Buckwheat. No more tonnage is used. The results are better heating and reduced fuel bills.

BUCKWHEAT coal is the fuel for low-cost heating. It costs only $7 to $8 a ton! More and more owners are realizing the economy and dependability of burning Buckwheat coal with Wing Motor Blowers. These blowers furnish the necessary forced draft to burn dependable low-cost Buckwheat coal.

Here's a fine opportunity for you to make good money by selling and installing Wing Blowers. Let us tell you more about them. The coupon below is for your convenience.

L. J. Wing Mfg. Co.

158 West 14th St., New York, N. Y.

L. J. WING MFG. CO., 158 W. 14th St., New York, N. Y.
Please send, without obligation, the Wing Motor Blower Bulletin, and full details on how I can make money by installing Wing Blowers.

Name .....

Address .....

.....

BOOKS ON HEATING AND VENTILATION

THE DESIGN OF GRAVITY-CIRCULATION WATER HEATING SYSTEMS, by F. E. Giesecke, Ph. D. A book, remarkable for its conciseness and clearness of expression, which contains the essence of the information needed for the proper design of gravity water heating systems, based on the principle that the frictional resistance must equal the force maintaining flow. The importance of the presentation is evidenced by the fact that the entire water heating section of the A. S. H. & V. E. Compendium of Modern Practice has been discarded and replaced with a new section by Doctor Giesecke, embodying the methods here presented in detail. 64 pages of text and 10 pages of tables and charts. Price, $3.00.

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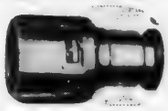

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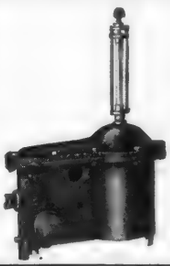

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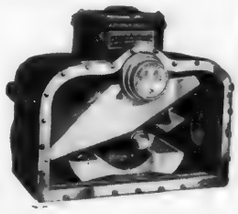

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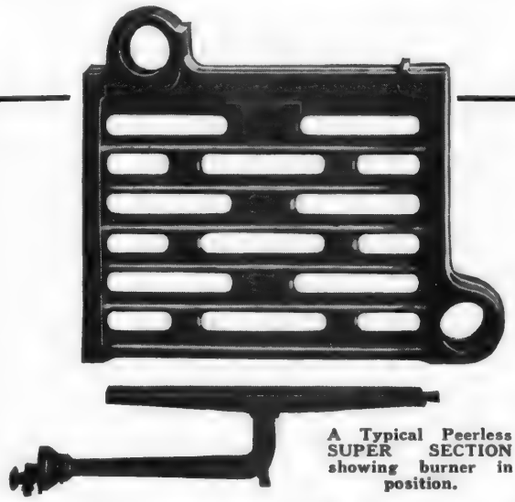

A Typical Peerless SUPER SECTION showing burner in position.

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The worth of the section depends upon DESIGN, MATERIAL and WORKMANSHIP.

Peerless Super Sections are cast from gray iron of a special analysis which gives close grain structure and maximum toughness.

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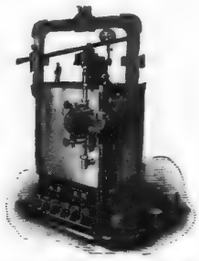

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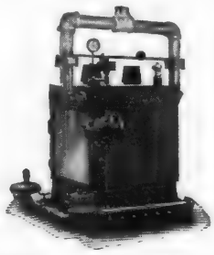

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MERCOID controls were especially designed to electrically and automatically control boiler temperatures, pressures and vacuum. And because of a total elimination of all arcing and corrosion, this simple inexpensive instrument gives complete protection against troublesome servicing. A feature which is extremely important and desired by every heating engineer.

Mercoids also have a wide range of control—from 1 lb. to 100 lbs. on pressure, and on vapor they can be set for control as low as one ounce.

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In every respect Mercoids have no superiors for the control of automatic stokers and blower burners such as the Culm and Buckwheat.

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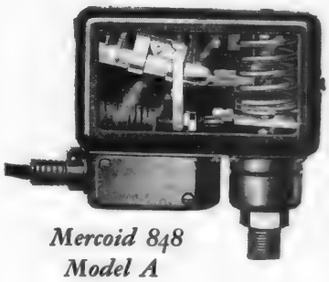


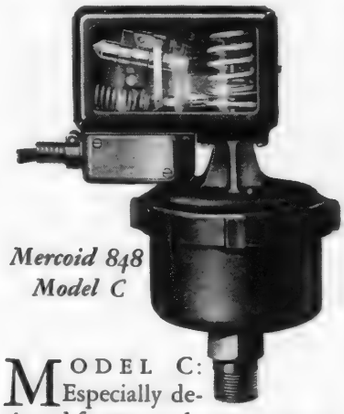
Mercoid 848 Model A

MODEL A-1: For low pressure—1 lb. to 15 lbs. Can be set for control as close as 1 lb.

Model A-3: Vapor-vacuum control—circuit to motor broken in pressure but makes in vacuum—regulation as close as 1 pound.

Model B-1: For high pressure. B-1 can be set to maintain any pressure between 10 lbs. and 60 lbs. and can be set as closely as 1½ or even less if desired.

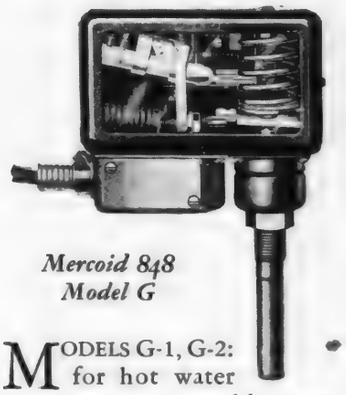
Model B-4: Is for pressures from 50 lbs. to 100 lbs. Controls as close as 2 lbs. or wider if desired. For example: instrument can be set to break circuit at 100 lbs. and make at 98.



Mercoid 848 Model C

MODEL C: Especially designed for vapor, low pressure or vacuum. Adjustable for any pressure between 3-inch vacuum and 3½ lbs. Control can be secured as close as 1 ounce or wider if desired.

This is the ideal control for vapor work—for example: the instrument can be set to break circuit at, say, 8 ounces, but will not make until slight vacuum has been secured. However, it can be set to operate entirely on pressure—breaking at 8 ounces and making at 1 ounce, or breaking at 6 and making at 2 ounces, etc.



Mercoid 848 Model G

MODELS G-1, G-2: for hot water temperatures control between 110°—220° with control as close as 5° or as wide as 40°.

The Mercoid 845 thermostat is for residence work or for any job where temperature control is desired. The 845 is connected in series with boiler control to start and stop motor according to room temperature. The Boiler control will always limit the boiler pressure or temperature regardless of the thermostat's operation. The 845 is widely used with Oil Burners and Unit Heaters.

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Spray Engineering Co., Boston, Mass.
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Western Engineering Co., San Francisco, Calif.

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New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Corp., Phila., Pa.

DISTILLERS, (WATER)
Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

DRAFT APPLIANCES
Draft-A-Justor Corp., Chicago, Ill.
International Fuel Service Corp., Bridgeport, Conn.

DRYING SYSTEMS
(See Air Cooling & Drying Systems).

DUST COLLECTING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Midwest Air Filters, Inc., Bradford, Pa.
Reed Air Filter Co., Inc., Louisville, Ky.
Skinner Bros. Mfg. Co., St. Louis, Mo.

DUST COLLECTORS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
York Heating & Ventilating Corp., Phila., Pa.

ENGINES, STEAM, AUTOMATIC
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, Ohio.
Clarage Fan Co., Kalamazoo, Mich.
Frost Mfg. Co., Galesburg, Ill.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

ENGINES, STEAM, HIGH SPEED
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, Ohio.
Clarage Fan Co., Kalamazoo, Mich
Frost Mfg. Co., Galesburg, Ill.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.

EQUALIZING LOOPS
Hoffman Specialty Co., New York.
Sarco Co., Inc., New York.

EVAPORATORS, BOILER FEED MAKE-UP
Buffalo Forge Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Foster Wheeler Corporation, New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

EXHAUST HEADS
Aeolus Dickinson, Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

EXHAUST SYSTEMS
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Skinner Bros. Mfg. Co., St. Louis, Mo
Sturtevant Co., B. F., Hyde Park Boston, Mass.
Wing Mfg. Co., L. J., New York.

EXHAUST SYSTEMS, ACID
Duriron Company, Inc., The, Dayton, O.

EXPANSION JOINTS
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., North Tonawanda, N. Y.
Badger & Sons Co., E. B., Boston, Mass.
Central Station Steam Co., Detroit, Mich.
Foster Wheeler Corporation, New York.
Fulton Sylphon Co., Knoxville, Tenn.
Gradon Mfg. Co., Philadelphia, Pa.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Walworth Co., New York
Webster & Co., Warren, Camden, N. J

EXPANSION SHELLS
Phillips Drill Co., Chicago, Ill.

FANS, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

FANS, DISC PRESSURE
DeBothezat Impeller Co., Inc., New York.

FANS, SUPPLY AND EXHAUST
Airmaster Corporation, Chicago, Ill.
American Blower Co., Detroit, Mich
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York
Emerson Electric Mfg. Co., St. Louis, Mo.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Typhoon Fan Co., New York.
Wing Mfg. Co., L. J., New York.

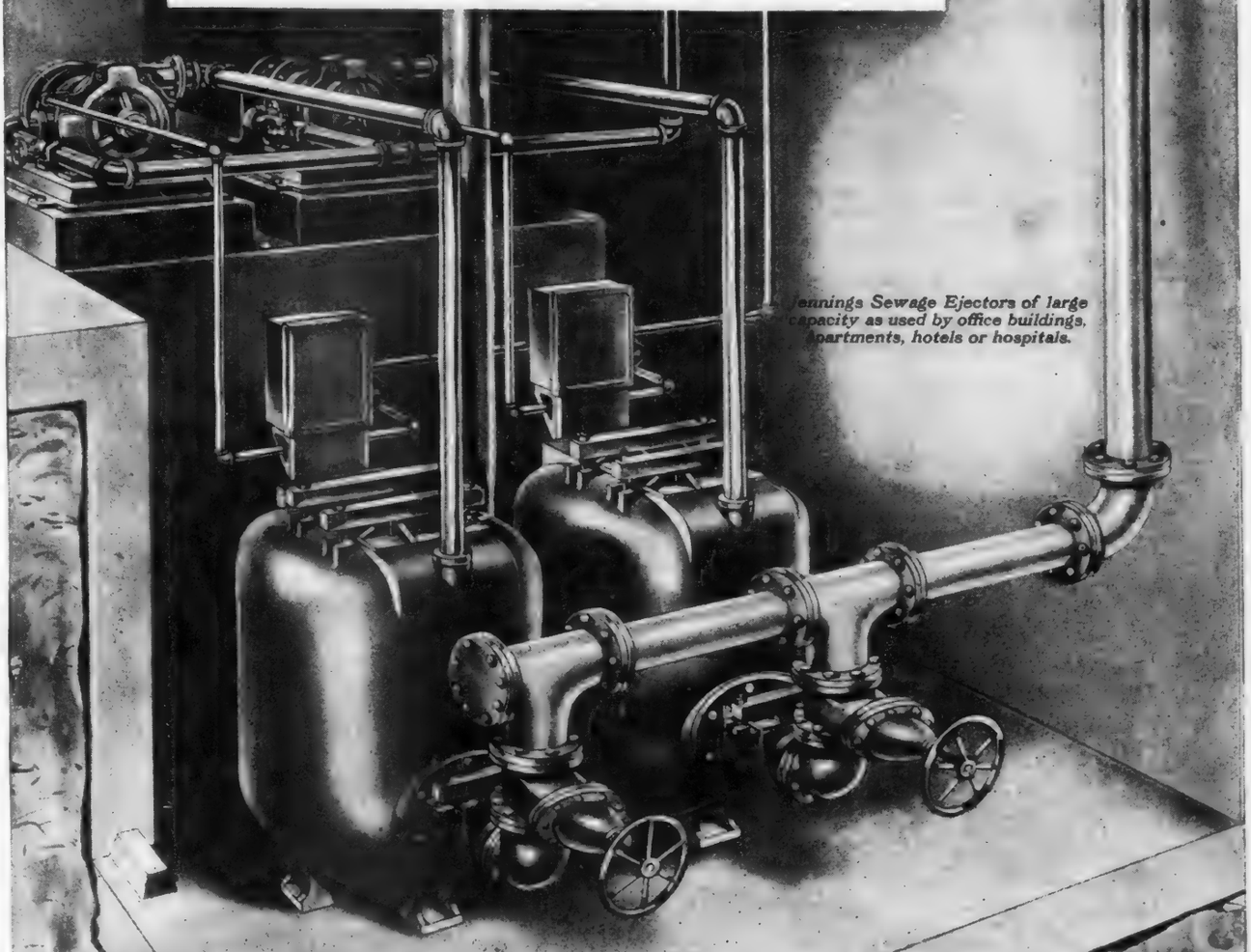
FEEDERS, BOILER
Cashin Co., W. D., Boston, Mass.
Cissell Mfg. Co., W. M., Louisville, Ky.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Walworth Co., New York.

Where toilets are below street sewer

WHEREVER toilets are located in basements below the level of the street sewer, it is good practice to put in a Jennings Sewage Ejector.

Soil, sewage and drainage flow into the ejector pot by gravity. Here such waste matter accumulates until the pot is full; whereupon the sewage is discharged by means of compressed air into the street sewer overhead.

Operation is automatic. Also reliable. There are no inaccessible or complicated parts likely to get out of order or need attention. No screens to clean. No storage basins. Write for full particulars.



Jennings Sewage Ejectors of large capacity as used by office buildings, apartments, hotels or hospitals.

Jennings Pumps

THE NASH ENGINEERING CO. 81 WILSON ROAD SOUTH NORWALK, CONN.

FILTERS, (AERATING)
Davis Engineering Corp., New York.

FILTERS, CRANK CASE OIL
Nugent & Co., Inc., Wm. W., Chicago, Ill.

FILTERS, FEED-WATER
Davis Engineering Corp., New York.

FITTINGS, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

FITTINGS, DISTRIBUTOR
Blake Specialty Co., Rock Island, Ill.

FITTINGS, FLANGED
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Walworth Co., New York

FLANGES
Clow & Sons, James B., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Walworth Co., New York

GAS BURNERS
Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.

GASKETS, ASBESTOS
Jenkins Bros., New York.
Johns-Manville Corp., New York.

GASKETS, METALLIC
Jenkins Bros., New York.

GASKETS, RUBBER
Jenkins Bros., New York.

GAUGE BOARDS
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Clow & Sons, James B., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

GAUGE GLASSES
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Jenkins Bros., New York.

GAUGES, ALTITUDE
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
United States Radiator Corp., Detroit, Mich.

GAUGES, DRAFT
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

GAUGES, HYDRAULIC
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.

GAUGES, OUNCE GRADUATED
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.

GAUGES, PRESSURE
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.

GAUGES, TANK
King-Seeley Corp., Ann Arbor, Mich.

GAUGES, VACUUM
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

GAUGES, VACUUM (COMPOUND)
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

GAUGES, WATER
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York

GENERATOR COOLING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Reed Air Filter Co., Inc., Louisville, Ky.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

GOVERNORS, (PUMP)
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
Webster & Co., Warren, Camden, N. J.

GRATES, DUMPING
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio
Titusville Iron Works Co., The, Titusville, Pa

GRATES, ROCKING
Kewanee Boiler Corp., Kewanee, Ill.
Page Boiler Co., Wm. H., New York.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.

GRATES, SHAKING
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Page Boiler Co., Wm. H., New York.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, SHAKING AND DUMPING
Frost Mfg. Co., Galesburg, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, SHAKING, CIRCULAR
Fitzgibbons Boiler Co., Inc., New York.
Pyramid Iron Products Corp., New York.
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, STATIONARY
Fitzgibbons Boiler Co., Inc., New York.
Frost Mfg. Co., Galesburg, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

HEAT CABINETS
Clow & Sons, James B., Chicago, Ill.
McQuay Radiator Corp., Chicago, Ill.
Metal Stamping Co., Long Island City.
Modine Mfg. Co., Racine, Wis.
Nelson Corp., Herman, The, Moline, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Trane Co., The, LaCrosse, Wis.

HEATERS, AIR, FAN SYSTEM
Aerofin Corp., Newark, N. J.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Dwyer Equipment Co., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
National Air Filter Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Trane Co., The, LaCrosse, Wis.
Wing Mfg. Co., L. J., New York.

HEATERS, DOMESTIC WATER
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Blake Specialty Co., Rock Island, Ill.
Davis Engineering Corp., New York.
Excelso Products Corporation, Buffalo, N. Y.
Foster Wheeler Corporation, New York.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Illinois Malleable Iron Co., Chicago, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Leader Iron Works, Decatur, Ill.
Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
Monitor Boiler Co., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., The, Erie, Pa.
Taco Heaters, Inc., New York.
Titusville Iron Works Co., The, Titusville, Pa.
United States Radiator Corp., Detroit, Mich.
Weil-McLain Co., Chicago, Ill.
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, ELECTRICAL UNIT
American Blower Co., Detroit, Mich.

HEATERS, FEED WATER, (CLOSED)
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Foster Wheeler Corporation, New York.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Frost Mfg. Co., Galesburg, Ill.
Gradon Mfg. Co., Philadelphia, Pa.
Illinois Malleable Iron Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., The, Erie, Pa.
Stanwood Corporation, Cincinnati, Ohio
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, FEED WATER, (OPEN)
Frost Mfg. Co., Galesburg, Ill.
National Pipe Bending Co., New Haven, Conn.
Sims Co., The, Erie, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Webster & Co., Warren, Camden, N. J.

HEATERS, FUEL-OIL
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Electrol, Inc., St. Louis, Mo.
Excelso Products Corporation, Buffalo, N. Y.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Heat Transfer Products, Inc., New York
National Air Filter Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Taco Heaters, Inc., New York.
Titusville Iron Works Co., The, Titusville, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, UNIT
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Dwyer Equipment Co., Chicago, Ill.
McQuay Radiator Corp., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
Nelson Corp., Herman, The, Moline, Ill.
New York Blower Co., Chicago, Ill.
Peerless Unit Ventilation Co., Inc., New York.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Trane Co., The, LaCrosse, Wis.
Typhoon Fan Co., New York.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Corp., Phila., Pa.

HEATING SYSTEMS, GAS
Clow & Sons, James B., Chicago, Ill.

HEATING SYSTEMS, VACUUM
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Spencer Heater Co., Williamsport, Pa.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

HEATING SYSTEMS, VAPOR
American District Steam Co., North Tonawanda, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton Heating Corporation, New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Spencer Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

HEATING SYSTEMS, WATER
American Radiator Co., Buffalo, N. Y.
Bishop & Babcock Sales Co., Cleveland Ohio.
Grinnell Co., Providence, R. I.
Hornung, J. C., Chicago, Ill.
Mueller Co., Decatur, Ill.
Page Boiler Co., Wm. H., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Spencer Heater Co., Williamsport, Pa.
Thrush & Co., H. A., Peru, Ind.
United States Radiator Corp., Detroit, Mich.

HUMIDIFIERS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Grinnell Co., Providence, R. I.
Heat Transfer Products, Inc., New York
Johnson Service Co., Milwaukee, Wis.
Midwest Air Filters, Inc., Bradford, Pa.
National Air Filter Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
York Heating & Ventilating Corp., Phila., Pa.

HUMIDITY CONTROL
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Engineering Corp., Newark, N. J.
Foxboro Co., Inc., The, Foxboro, Mass.
Grinnell Co., Providence, R. I.
Johnson Service Co., Milwaukee, Wis.
National Air Filter Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.

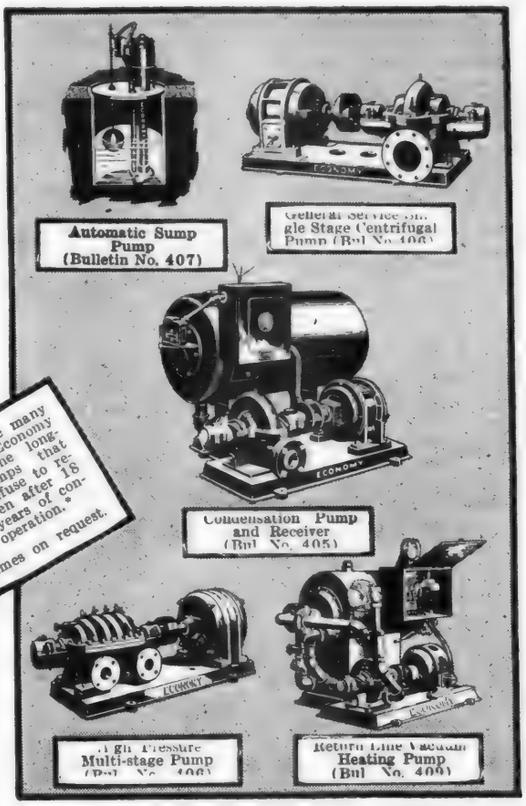
INSTRUMENTS, ELECTRIC MEASURING
Bristol Co., The, Waterbury, Conn.

INSTRUMENTS, INDICATING AND RECORDING
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.

INSULATION, BOILER, PIPE, ETC.
(See Covering, Boiler, Pipe, etc.)

INSULATION, BUILDING
Banner Rock Products Co., Alexandria, Ind.
Flax-li-num Insulating Co., St. Paul, Minn.
Insulite Co., Minneapolis, Minn.
Johns-Manville Corp., New York.

MANOMETERS
American Blower Co., Detroit, Mich.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass


Automatic Sump Pump (Bulletin No. 407)
Condensation Pump and Receiver (Bul No. 405)
Return Line Vacuum Heating Pump (Bul No. 409)
A few of the many types of Economy pumps — the long-lived pumps that owners refuse to replace even after 18 to 21 years of constant operation.*
*Names on request.

The Right Pump for Each Job

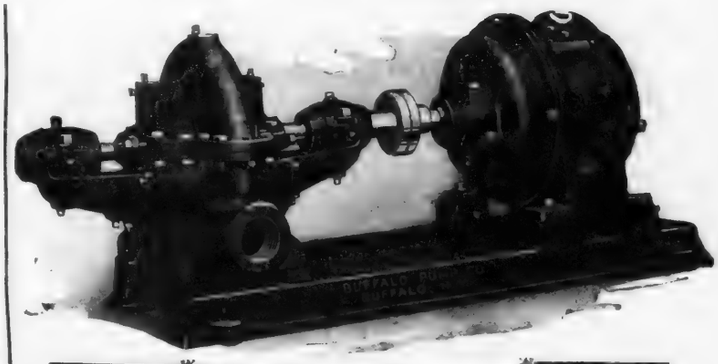
Find It In This Complete Line

There is a distinct advantage in using one make of pump for all water handling problems. Responsibility for performance is centralized. Uniformity of design and interchangeability of spare parts are secured. Leading engineers recognize these advantages, and are specifying Economy Pumps extensively. Economy's twenty-one years' experience in building pumps of outstanding quality for all jobs assures authoritative counsel on individual pump problems—whether water supply, sewage disposal, boiler feeding, or heating—whether heavy mill service or light automatic duty.

Economy engineers will be glad to cooperate with you in obtaining correct capacities. Send for bulletin describing the pump that suits your needs.

Economy Pumping Machinery Company
3431 West 48th Place, Chicago
Representatives in Principal Cities—
Telephone & Address under Economy Pumping Machinery Co.

Economy Pumps



"Buffalo" Class "S" Pumps have double suction, hydraulically balanced impeller. Can be built for right hand or left hand rotation, motor or pulley drive.

—*for general service*

Satisfied owners throughout America having used "Buffalo" Class "S" Pumps day in and day out, year after year without much attention and little or no repairs, realize the dependability of these pumps.

Ring oiling bearings, extra deep stuffing boxes, brass water seals, brass clearance rings are only a part of this efficient pump.

The impeller is hydraulically balanced at all times; the double-suction draws in water at opposite sides in equal volumes and pressures, thereby eliminating end thrust. Every impeller is carefully machined to give close clearances and is accurately tested for balance.

The casing is horizontally divided, making it possible to open the pump for inspection without breaking pipe connections.

Further particulars gladly sent on request.

Buffalo Steam Pump Co.

480 Broadway **Buffalo, N. Y.**

Atlanta	Indianapolis	Pittsburgh
Boston	Los Angeles	San Francisco
Chicago	Minneapolis	Seattle
Charlotte	New Orleans	St. Louis
Cincinnati	New York	Washington
Cleveland	Omaha	Toledo
Detroit	Philadelphia	

IN CANADA:
Canadian Blower & Forge Co., Ltd., Kitchener, Ontario

MECHANICAL DRAFT APPARATUS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York
Mason Regulator Co., Boston, Mass.
New York Blower Co., Chicago, Ill.
Pyramid Iron Products Corp., New York.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

METALS, THERMOSTATIC
Chace Valve Co., W. M., Detroit, Mich.

METERS, CONDENSATION
American District Steam Co., North Tonawanda, N. Y.
Central Station Steam Co., Detroit, Mich.

METERS, FEED WATER
Central Station Steam Co., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

METERS, FLOW
Foxboro Co., Inc., The, Foxboro, Mass.
Spray Engineering Co., Boston, Mass.

METERS, PITOT TUBE
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.

METERS, STEAM
American District Steam Co., North Tonawanda, N. Y.
Builders Iron Foundry, Providence, R. I.

MOTORS (ELECTRIC)
Baldor Electric Co., St. Louis, Mo.
Century Electric Co., St. Louis, Mo.
Emerson Electric Mfg. Co., St. Louis, Mo.
Janette Mfg. Co., Chicago, Ill.
Lincoln Electric Co., Cleveland, Ohio.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

NOZZLES, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

NOZZLES, SPRAY
American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
General Air Filters Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

OIL BURNERS
American Nokol Corp., Chicago, Ill.
Automatic Burner Corp., Chicago, Ill.
Calorgil Burner Corp., New York.
Cleveland Steel Products Corp., Cleveland, Ohio
Electrol, Inc., St. Louis, Mo.
Hardinge Bros., Inc., Chicago, Ill.
Johnson Co., S. T., Oakland, Cal.
McIlvaine Burner Corporation, Chicago, Ill.
Nu-Way Corporation, Rock Island, Ill.
Pascoe Company, The Wm. H., Chicago, Ill.
Petroleum Heat & Power Co., New York.
Preferred Oil Burners, Inc., Peoria, Ill.
Winslow Boiler & Engineering Co., Chicago, Ill.
York Oil Burner Co., York, Pa.

OIL BURNER EQUIPMENT
American Steam Pump Co., Battle Creek, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Draft-A-Justor Corp., Chicago, Ill.
Hornung, J. C., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Johnston Brothers, Inc., Ferrysburg, Mich.
Teesdale Mfg. Co., Grand Rapids, Mich.
Preferred Utilities Mfg. Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Webster Electric Co., Racine, Wis.

OIL BURNER IGNITION AND CONTROL EQUIPMENT
Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Webster Electric Co., Racine, Wis.

PIPE, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

PIPE, CAST IRON
Clow & Sons, James B., Chicago, Ill.

PIPE, STEEL
Clow & Sons, James B., Chicago, Ill.
National Tube Co., Pittsburgh, Pa.

PIPE, WOOD
Wyckoff & Son Co., A., Elmira, N. Y.

PIPE BENDING
Badger & Sons Co., E. B., Boston, Mass.
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Walworth Co., New York
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING (WOOD)
American District Steam Co., North Tonawanda, N. Y.
Wyckoff & Son Co., A., Elmira, N. Y.

PIPE HANGERS
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Walworth Co., New York

PIPE THREADING & CUTTING MACHINES
National Pipe Bending Co., New Haven, Conn.

PRESSURE REDUCING VALVES
(See Regulators, Pressure).

PULLEYS, VARIABLE SPEED
Horton Mfg. Co., Minneapolis, Minn.

PUMPS, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

PUMPS, CENTRIFUGAL
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Foster Wheeler Corporation, New York.
Nash Engineering Co., So. Norwalk, Conn.
Trane Co., The, LaCrosse, Wis.

PUMPS, CENTRIFUGAL, VACUUM HEATING
Ames Pump Co., New York.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.

PUMPS, CONDENSATION
American Steam Pump Co., Battle Creek, Mich.
Ames Pump Co., New York.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
Eclipse Fuel Engineering Co., Rockford,
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Weil Pump Co., Chicago, Ill.

PUMPS, OIL
Connor Co., Inc., The W. B., New York.
Janette Mfg. Co., Chicago, Ill.
Nugent & Co., Inc., Wm. W., Chicago, Ill.

PUMPS, RECIPROCATING STEAM
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.

PUMPS, SUMP
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Economy Pumping Machinery Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.

PUMPS, TURBINE
Chicago Pump Co., Chicago, Ill.
Foster Wheeler Corporation, New York.
Nash Engineering Co., So. Norwalk, Conn.

PUMPS, VACUUM
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Foster Wheeler Corporation, New York.
Janette Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.

RADIATOR ENCLOSURES OR SHIELDS
Acme Radiator Shield Co., Cincinnati, Ohio.
American Metal Products Corp., St. Louis, Mo.

RADIATOR HANGERS
American Radiator Co., Buffalo, N. Y.
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Hartmann Co., Charles, Brooklyn, N. Y.
Healy-Ruff Co., St. Paul, Minn.
Kewanee Boiler Corp., Kewanee, Ill.
McAlear Mfg. Co., Chicago, Ill.
United States Radiator Corp., Detroit, Mich.

RADIATORS, BRASS
Rome Brass Radiator Corp., New York.
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.

RADIATORS, GAS HEATED
Clow & Sons, James B., Chicago, Ill.

RADIATORS, STEAM & WATER
American Radiator Co., Buffalo, N. Y.
Burnham Boiler Corp., Irvington, N. Y.
Clow & Sons, James B., Chicago, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
National Radiator Corp., Johnstown, Pa.
Nelson Corp., Herman, The, Moline, Ill.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
United States Radiator Corp., Detroit, Mich.

RECEIVERS, AIR
Brownell Co., The, Dayton, Ohio.
Frost Mfg. Co., Galesburg, Ill.
National Pipe Bending Co., New Haven, Conn.
Titusville Iron Works Co., The, Titusville, Pa.
Vapor Engineering Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

RECEIVERS, CONDENSATION
American District Steam Co., North Tonawanda, N. Y.
American Steam Pump Co., Battle Creek, Mich.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Titusville Iron Works Co., The, Titusville, Pa.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

REGULATORS, BOILER-FEED
Atlas Valve Co., Newark, N. J.
Cissell Mfg. Co., W. M., Louisville, Ky.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

REGULATORS, DAMPER
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Atlas Valve Co., Newark, N. J.
Draft-A-Justor Corp., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Gorton Heating Corporation, New York.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Regulator Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Thrush & Co., H. A., Peru, Ind.
Trane Co., The, LaCrosse, Wis.
Wing Mfg. Co., L. J., New York.

REGULATORS, PRESSURE
American District Steam Co., North Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kainer & Company, Chicago, Ill.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Mueller Co., Decatur, Ill.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Teeple Co., L. R., Portland, Oregon

REGULATORS, TEMPERATURE
(See Temperature Control).

SEPARATORS, OIL
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Gradon Mfg. Co., Philadelphia, Pa.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Webster & Co., Warren, Camden, N. J.

SEPARATORS, STEAM
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Gradon Mfg. Co., Philadelphia, Pa.
Illinois Engineering Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Sims Co., The, Erie, Pa.
Webster & Co., Warren, Camden, N. J.

SPRAY COOLING SYSTEMS
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

SPRAY NOZZLES
(See Nozzles, Spray).

STRAINERS, OIL
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill
Janette Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis
Nugent & Co., Inc., Wm. W., Chicago, Ill.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.

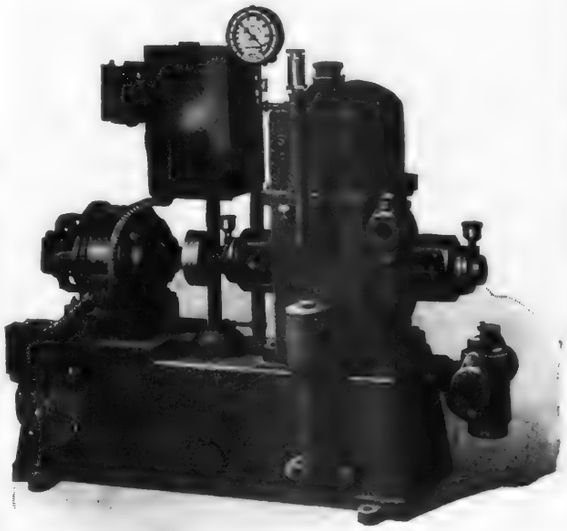
STRAINERS, STEAM
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.

STRAINERS, WATER
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis
Ross Heater & Mfg. Co., Buffalo, N. Y
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass

TEMPERATURE CONTROL
Absolute Con-Tac-Tor Corp., Elkhart Ind.
American Radiator Co., Buffalo, N. Y
American Schaeffer & Budenberg Division, Consolidated Asheroft Hancock Company, Inc., Brooklyn, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Carrier Engineering Corp., Newark N. J.
Foxboro Co., Inc., The, Foxboro, Mass
Fulton Sylphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill
Kieley & Mueller, Inc., New York.
Mercoid Corporation, Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Pyramid Iron Products Corp., New York.
Raymond, F. I., River Forest, Ill.
Sarco Co., Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.
Teeple Co., L. R., Portland, Oregon
Thrush & Co., H. A., Peru, Ind.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.

THERMOMETERS, RECORDING & INDICATING
American Radiator Co., Buffalo, N. Y
American Schaeffer & Budenberg Division, Consolidated Asheroft Hancock Company, Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York

SKIDMORE



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high or low water line in the system when operating on float control?

The Skidmore pump on interceptor base is designed to give low water line operation without pitting.

The unit is self contained, ball bearing, and operated by one motor. It produces vacuum on the system even when operating on float control, a desirable feature.

The unit consists of two pumps in one housing on one shaft, an air pump and a centrifugal pump for boiler feed. Motor and pump are mounted directly on interceptor base. This construction means compactness in design and minimum floor space occupied.

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United States Radiator Corp., Detroit, Mich.

THERMOSTATS

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
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Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Johnson Service Co., Milwaukee, Wis.
Mercoid Corporation, Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Thrush & Co., H. A., Peru, Ind.
United States Radiator Corp., Detroit, Mich.

TRAPS, BUCKET

Trerice Co., H. O., Detroit, Mich.

TRAPS, FLOAT

Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Sarco Co., Inc., New York.

TRAPS, INVERTED BUCKET (STEAM AND AIR)

Armstrong Machine Works, Three Rivers, Mich.

TRAPS, LIFTING

Lytton Mfg. Corp., Franklin, Va.

TRAPS, RADIATOR

American District Steam Co., North Tonawanda, N. Y.
Armstrong Machine Works, Three Rivers, Mich.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johns-Manville Corp., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Sarco Co., Inc., New York.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

TRAPS, RETURN

American Blower Co., Detroit, Mich.
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville Corp., New York.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

TRAPS, STEAM

American Blower Co., Detroit, Mich.
American District Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Clow & Sons, James B., Chicago, Ill.
Connor Co., Inc., The W. B., New York.
Davis Engineering Corp., New York.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
General Air Filters Corp., New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville Corp., New York.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Trerice Co., H. O., Detroit, Mich.

TRAPS, VACUUM

American Blower Co., Detroit, Mich.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

TUBING, COPPER AND BRASS

Wolverine Tube Co., Detroit, Mich.

TURBINES, STEAM

Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

TURBO-BLOWERS

Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

UNDERGROUND PIPE CONDUITS

American District Steam Co., North Tonawanda, N. Y.
Johns-Manville Corp., New York.
Ric-wil Co., The, Cleveland, Ohio.
Wyckoff & Son Co., A., Elmira, N. Y.

VACUUM CLEANING APPARATUS

American Radiator Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

VALVES, ACID RESISTING

Duriron Company, Inc., The, Dayton, O.

VALVES, AIR, AUTOMATIC

American Radiator Co., Buffalo, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Hoffman Specialty Co., New York.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Powers Regulator Co., Chicago, Ill.
Russell & Co., W. A., New York.
United States Radiator Corp., Detroit, Mich.

VALVES, AIR RELIEF

American Radiator Co., Buffalo, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Gorton Heating Corporation, New York.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Sarco Co., Inc., New York.
Stay-Rite Co., Inc., Cleveland, Ohio.
Trane Co., The, LaCrosse, Wis.

VALVES, BACK PRESSURE

Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York

VALVES, BALANCED

Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.

VALVES, BLOW-OFF

Jenkins Bros., New York.
Lytton Mfg. Corp., Franklin, Va.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York

VALVES, CHECK

Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Milwaukee Valve Co., Milwaukee, Wis.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York.

VALVES, FLOAT

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Schutte & Koerting Co., Philadelphia, Pa.

VALVES, GATE

American District Steam Co., North Tonawanda, N. Y.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York.

VALVES, GLOBE, ANGLE & CROSS

Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Phila., Pa.
Walworth Co., New York.

VALVES, HYDRAULIC-OPERATING

Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
Walworth Co., New York

VALVES, MAGNETIC

Absolute Con-Tac-Tor Corp., Elkhart, Ind.

VALVES, NON-RETURN

Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York

VALVES, RADIATOR

American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Capitol Brass Works, Detroit, Mich.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Gorton Heating Corporation, New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.
Vapor Engineering Co., New York.
Walworth Co., New York
Webster & Co., Warren, Camden, N. J.

VALVES, REDUCING

(See Regulators, Pressure).

VALVES, REGULATING

Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kainer & Company, Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Walworth Co., New York

VALVES, RELIEF (WATER)

American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Kainer & Company, Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
National Radiator Corp., Johnstown, Pa.
Thrush & Co., H. A., Peru, Ind.
United States Radiator Corp., Detroit, Mich.

VALVES, SAFETY

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Division, Consolidated Ashcroft Hancock Company, Inc., Brooklyn, N. Y.
Jenkins Bros., New York.
National Radiator Corp., Johnstown, Pa.
Stay-Rite Co., Inc., Cleveland, Ohio.
United States Radiator Corp., Detroit, Mich.
Walworth Co., New York

VALVES, STOP AND CHECK

(See Valves, Non-Return).

VENTILATING SYSTEMS

American Blower Co., Detroit, Mich.
American Radiator Co., Buffalo, N. Y.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Lakeside Company, The, Hermansville, Mich.
Nelson Corp., Herman, The, Moline, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Typhoon Fan Co., New York.
Wing Mfg. Co., L. J., New York.

VENTILATING SYSTEMS, ACID

Duriron Company, Inc., The, Dayton, O.

VENTILATORS

Bayley Blower Co., Milwaukee, Wis.
DeBothezat Impeller Co., Inc., New York
Midwest Air Filters, Inc., Bradford, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

VENTILATORS, MUSHROOM

Aeolus Dickinson, Chicago, Ill.
American Blower Co., Detroit, Mich.
American Metal Products Corp., St. Louis, Mo.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Knowles Mushroom Ventilator Co., New York.
Ventilating Products Co., Chicago, Ill.

VENTILATORS, ROOF

Aeolus Dickinson, Chicago, Ill.

VENTILATORS, UNIT

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
DeBothezat Impeller Co., Inc., New York
Dwyer Equipment Co., Chicago, Ill.
Nelson Corp., Herman, The, Moline, Ill.
New York Blower Co., Chicago, Ill.
Peerless Unit Ventilation Co., Inc., New York.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

WATER STERILIZERS

Clow & Sons, James B., Chicago, Ill.

WEATHER STRIPS, METAL

Athey Co., Chicago, Ill.

WELDERS, ELECTRIC ARC

Lincoln Electric Co., Cleveland, Ohio.

WRENCHES, STILLSON

Walworth Co., New York.

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The Industry's Leader

Type TU TEESDALE Automatic Pump, capacity 30 gal. per hour, listed as standard by Underwriters' Laboratories. Approved, Board of Standards and Appeals, New York.

IT is a fine thing to gain leadership as we have done in the Automatic Oil Pump Field. And it's another thing to hold this leadership. But we propose to do that very thing.

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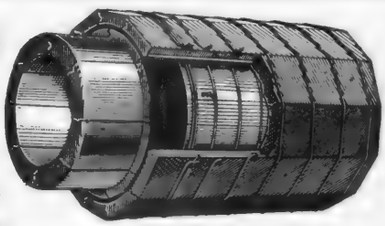

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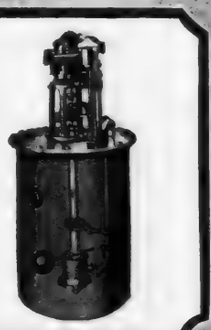

Fig. NRG 2001. "Weil" Type NRG Vertical Condensation Pump and Receiver. Occupies small space. Concrete pit unnecessary.

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Manufacturers of Better Centrifugal Pumps
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The reason that HAINES TRAPS are installed in fine buildings from one coast to the other is

They function year after year without need of attention or repair

WILLIAM S. HAINES & COMPANY

12TH AND BUTTONWOOD STS., PHILADELPHIA

Fable of the Sick Stag

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It is sometimes true, too, that a heating contractor, suffering from a temporary depression in his business, is visited by people who, aware of his situation, force from him a large portion of his rightful profit.

The wise contractor, however, knows if he persists in taking jobs at too low a price that his business will succumb; not so much perhaps from lack of sales, as from lack of profit, the nourishment of his business.

He senses that the better way is to ask a fair profit and submit with his bids distinctive quality features such as Weil-McLain Corrugated Heating Surfaces, Long Back-and-Forth Fire Travel and Scientific Combustion. Only quality and service can command an honest *profit* in the long run.

WEIL-McLAIN COMPANY

General Offices Chicago, Illinois | Boiler Factory Michigan City, Indiana | Radiator Factory Erie, Pa.

Fight Fuel Waste with

Weil-McLain

SCIENTIFIC COMBUSTION

BOILERS

"SEE THE WEIL-McLAIN JOBBER IN YOUR TERRITORY"

now before winter comes—

Folks are being urged to phone you

Hoffman ads in magazines and newspapers are saying to your customers, "NOW—before the rush begins, have your heating plant overhauled. And ask your heating contractor how he can vacuum-ize your system with Hoffman No. 2 Vacuum Valves."

This advertising campaign is designed to get those clean-out jobs to you *early*—and to help make them *profitable*.

NOW—before Winter comes, is the time to replace your customers' air valves with Hoffman No. 2 Vacuum Valves. We invite you to take full advantage of Hoffman advertising. Do just two things, (1) Check over your stock of Hoffman No. 2 Vacuum Valves. Be sure you have enough, (2) Then hitch up your window with Hoffman advertising. Hoffman representatives will arrange the entire window display if desired.

NOW, before the Fall rush of business, take advantage of this chance to land a flock of profitable jobs. Write us when you want your window trimmed. We'll do the rest.

HOFFMAN SPECIALTY COMPANY, INC.
Dept. C-42, 25 W. 45th St. New York City

Makers of the famous "Watchman-of-the-Coal-Pile" Air Valves and Hoffman Controlled Heat

NOW!
before WINTER comes—
Let your heating contractor perform this inexpensive miracle
DON'T put it off another day. Phone your heating and plumbing contractor. Say:—"Put my heating system in order. Clean out the boiler—and show me how you can vacuum-ize my system with Hoffman No. 2 Valves."
He will tell you: "To vacuum-ize your system is to lock out air, the element that robs the boiler of its ability to deliver all its heat. Mortal enemies, air and steam. Air destroys steam—robs it of its heat. If air is in a radiator steam cannot enter. Get that air out and lock it out with Hoffman No. 2 Valves—and the steam won't have to fight every inch of its way into radiators, pushing out the air and lifting its weight every time drafts are opened."
With air shut out, radiators fill with steam *15 minutes* (instead of an hour) after drafts are opened. When the fire is banked radiators continue to give off heat for *3 hours* (instead of 30 minutes), because air cannot get back to dissipate it.
What comfort this one simple change can bring! How easy

In the Saturday Evening Post, American Magazine, Literary Digest, Good Housekeeping, Better Homes & Gardens, and in big-circulation newspapers Hoffman is urging people to phone you about vacuum-izing their heating systems.

NOW..
before WINTER comes
let your heating contractor perform this inexpensive miracle
DON'T put it off another day. Phone your heating and plumbing contractor. Say this: "Put my heating system in order, clean out the boiler—and show me how to vacuum-ize my system with Hoffman No. 2 Valves."
He will tell you: "To vacuum-ize your system requires the locking out of air, the element that robs the boiler of its ability to deliver all its heat. Mortal enemies—air and steam. Air destroys steam, takes away its heat. Get that air out and lock it out with Hoffman No. 2 Valves—and the steam won't have to fight every inch of its way into radiators, pushing out air every time drafts are opened."
With air shut out and no resistance to overcome, radiators fill with steam *15 minutes* (instead of an hour) after